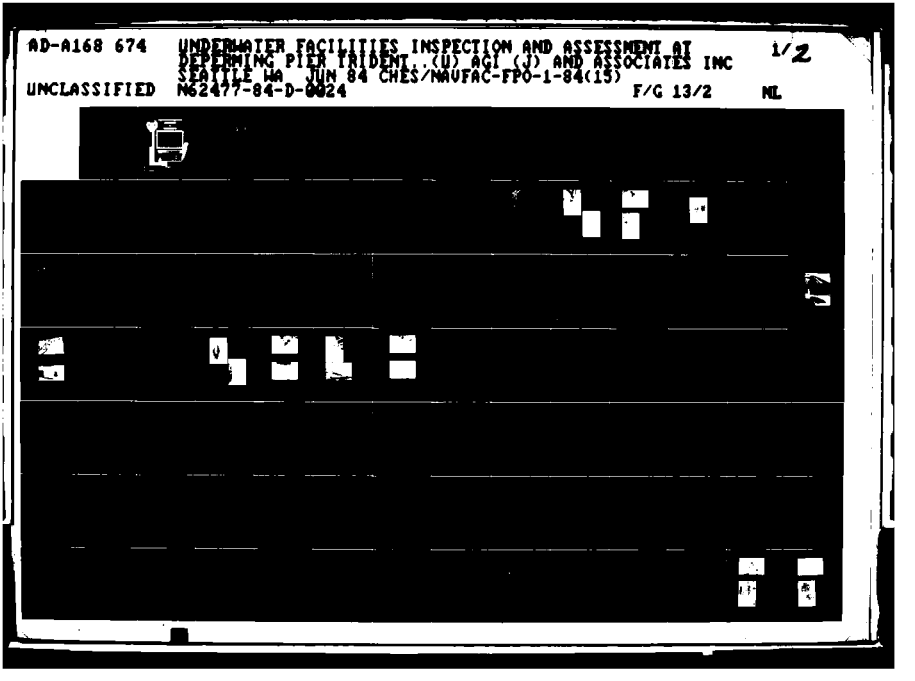
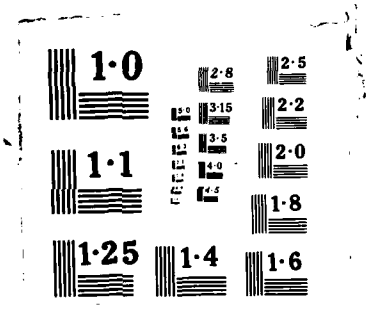
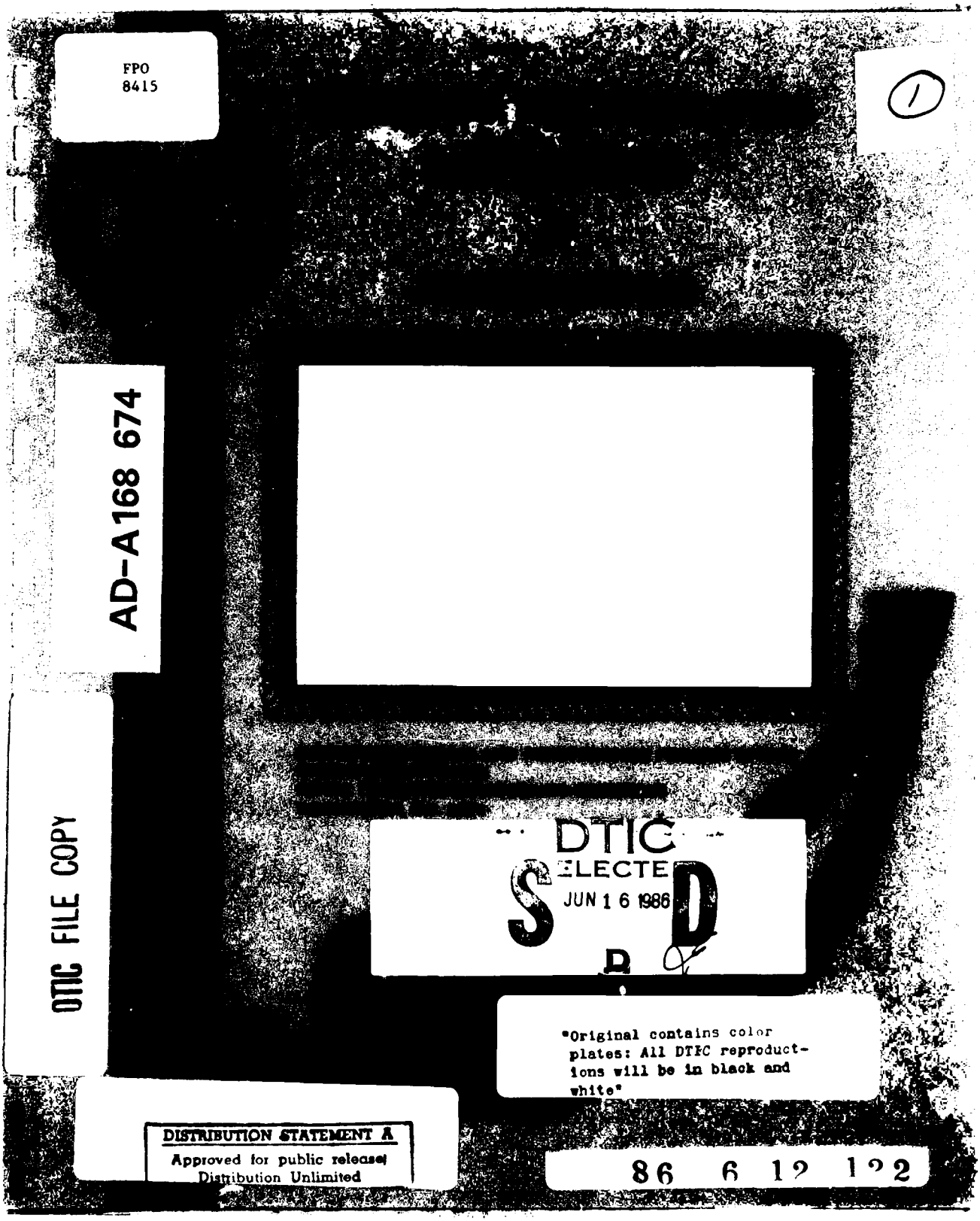
AD-A168 674 UNDERWATER FACILITIES INSPECTION AND ASSESSMENT AT DEPERMING PIER TRIDENT..(U) AGI (J) AND ASSOCIATES INC SEATTLE WA JUN 84 CHES/NAVFAC-FPO-1-84(15) 1/2

UNCLASSIFIED N62477-84-D-0024 F/G 13/2 NL




1·0
1·1
1·25
1·4
1·6
2·8
3·15
3·5
4·0
2·5
2·2
2·0
1·8


FPO
8415
AD-A168 674
DTIC FILE COPY
DTIC
ELECTE
JUN 16 1986
S D
Original contains color plates: All DTIC reproductions will be in black and white
DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited
86 6 12 122

UNDERWATER FACILITIES

INSPECTION AND ASSESSMENT

AT

DEPERMING PIER
TRIDENT REFIT FACILITY
BANGOR, WASHINGTON

FPO-1-84(15) June, 1984

Performed for:

Ocean Engineering and Construction Project Office
Chesapeake Division
Naval Facilities Engineering Command
Washington, D.C. 20374

Under:

Contract N62477-84-D-0024-0001

By:

J. Agi & Associates Inc.
1414 Alaskan Way, Suite 600
Seattle, Washington 90101

Project No.: 84-1-2-153

AD-A168 674

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION AVAILABILITY OF REP. Approved for public release; distribution is unlimited
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER Project No: 84-1-2-153	5. MONITORING ORGANIZATION REPORT # FPO-1-84(15)
6a. NAME OF PERFORM. ORG. 6b. OFFICE SYM J. Agi & Associates, Inc.	7a. NAME OF MONITORING ORGANIZATION Ocean Engineering & Construction Project Office CHESNAVFACENGCOM
6c. ADDRESS (City, State, and Zip Code) 1414 Alaskan Way, Suite 600 Seattle, WA 90101	7b. ADDRESS (City, State, and Zip) BLDG. 212, Washington Navy Yard Washington, D.C. 20374-2121
8a. NAME OF FUNDING ORG. 8b. OFFICE SYM	9. PROCUREMENT INSTRUMENT INDENT # N62477-84-D-0024-0001
8c. ADDRESS (City, State & Zip)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT # / PROJECT # / TASK # / WORK UNIT ACCESS #

11. TITLE (Including Security Classification)
Underwater Facilities Inspection and Assessment at Deperming Pier Trident Refit Facility Bangor, Washington

12. PERSONAL AUTHOR(S)

13a. TYPE OF REPORT	13b. TIME COVERED FROM TO	14. DATE OF REP. (YYMMDD) 84-06
15. PAGES 77		

16. SUPPLEMENTARY NOTATION

17. COSATI CODES FIELD GROUP SUB-GROUP	18. SUBJECT TERMS (Continue on reverse if nec.) Underwater inspection, Deperming, Trident Refit Facility Bangor, WA; Bangor, WA

19. ABSTRACT (Continue on reverse if necessary & identify by block number)
The 254 of the total 650 piles in the Magnetic Silencing Facility Deperming Pier belong to the Trident Refit Facility at Naval Submarine Base, Bangor, Washington not included in the 1980 inspection FPO-1-80(13) October 1980, were subjected to a Level I & Level II inspection. The current and previous (Con't)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT SAME AS RPT.	21. ABSTRACT SECURITY CLASSIFICATION
22a. NAME OF RESPONSIBLE INDIVIDUAL Jacqueline B. Riley	22b. TELEPHONE 22c. OFFICE SYMBOL 202-433-3881

DD FORM 1473, 84MAR SECURITY CLASSIFICATION OF THIS PAGE

BLOCK 19 (Con't)

inspections have now covered all the piles in the facility except for the recently added dolphins.

In addition to the piles, 30 timber pole troughs which span the space between the finger piers and support the X-loop cables, were also examined and measurements of mudline to bottom of trough were obtained for every other trough.

The overall condition of the examined piles is excellent. Eight piles have sustained minor mechanical damage in the form of ring shakes. In two piles this damage has resulted in marine borer (Bankia) attack, however, at this time the borer damage has not resulted in significant damage to the pile.

It is recommended that the above two piles with mechanical and marine borer damage be encased with plastic wrapping at the zones of damage. The cost of this would be approximately $5,000.00. The damage found in three piles during the previous inspection has been repaired.

The overall condition of the timber troughs is good. However, extensive marine borer damage was observed in the timber framing members at the pole/bent joint. Also, several timber members restraining the cable assemblies have sustained damage. It is recommended that a comprehensive and detailed inspection be carried out of all these members.

EXECUTIVE SUMMARY

The 254 of the total 650 piles in the Magnetic Silencing Facility Deperming Pier belonging to the Trident Refit Facility at Naval Submarine Base, Bangor, Washington not included in the Oct 1980 inspection, FPO-1-80(13) October, 1980, were subjected to a Level I and Level II inspection. The current and previous inspections have now covered all the piles in the facility except for the recently added dolphins.

In addition to the piles, 30 timber pole troughs which span the space between the finger piers and support the X-loop cables, were also examined and measurements of mudline to bottom of trough were obtained for every other trough.

The overall condition of the examined piles is excellent. Eight piles have sustained minor mechanical damage in the form of ring shakes. In two piles this damage has resulted in marine borer (*Bankia*) attack, however, at this time the borer damage has not resulted in significant damage to the pile.

It is recommended that the above two piles with mechanical and marine borer damage be encased with plastic wrapping at the zones of damage. The cost of this would be approximately $5,000.00. ~~The~~ damage found in three piles during the previous inspection has been repaired.

The overall condition of the timber troughs is good. However, extensive marine borer damage was observed in the timber framing members at the pole/bent joint. ~~Also,~~ several timber members restraining the cable assemblies have also sustained damage. It is recommended that a comprehensive and detailed inspection be carried out of all these members.

Keywords: Underwater inspection; Washington (State).

For details on the structure and recommended maintenance, refer to the accompanying Executive Summary Table.

DEPERMING PIER, BANGOR

EXECUTIVE SUMMARY TABLE

FACILITY SECTIONS	YEAR BUILT	TOTAL NO. OF PILES/ NUMBER INSPECTED	STRUCTURE SIZE	STRUCTURE TYPE	RECOMMENDATIONS	ESTIMATED COST OF RECOMMEND.	ESTIMATED TOTAL COST OF REPAIRS FOR PROJECTED DAMAGE
Access Trestle	1978	128/56	626' x 15'	Timber	Encase 1 pile in plastic wrap	$2,500.00	$5,000.00
Header Pier	1978	53/16	120' X 30'	Timber			
West Pier	1978	234/100	710' X 15'	Timber	Encase 1 pile in plastic wrap	$2,500.00	
East Pier	1978	235/82	710' X 15'	Timber			
Trough	1978	30/30 (No. of troughs)	80' X 2'	Timber	Inspect all cable assembly support timbers.	$15,000.00	

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF FIGURES AND DRAWINGS

LIST OF PHOTOGRAPHS

LIST OF PHOTOGRAPHS (Cont'd)

LIST OF TABLES

SECTION 1 - INTRODUCTION

1.1 CONTRACT

Department of the Navy
Chesapeake Division, Naval Facilities Engineering Command
Building 212
Washington Navy Yard, Washington, B.C. 20374

1.2 CONTRACT NO.

N62477-84-D-0024

1.3 INSPECTION DATE

4 June, 1984 (week of)

1.4 CONTRACT DESCRIPTION

The contractor shall provide all required engineering services necessary for underwater assessment of various Navy waterfront facilities as directed by the officer in charge and as specifically described in individual orders. The initial award under this contract is for the assessment of the structural condition of 254 timber piles not included in the previous inspection carried out in 1980 (N62477-81-C-0265) on the Magnetic Silencing Facility belonging to the Trident Refit Facility at the Naval Submarine Base, Bangor, Washington. These piles shall receive a Level I and a Level III inspection. In addition, a Level I general inspection shall be conducted on all of the cable support timber troughs within the open structure between the finger piers. Also, measurements will be obtained from the underside of the trough to the mudline on every other bent.

1.5 INTRODUCTION TO PROJECT

This report is prepared under the Underwater Inspection Program conducted by the Ocean Engineering Project Office (FPO-1), Chesapeake Division, Naval Facilities Engineering Command as part of NAVFAC's Specialized Inspection Program. This is a task oriented engineering service program in support of inspection, analysis and design of repairs of the submerged portions of Navy Waterfront Facilities.

This report covers the inspection carried out on the Deperming Pier at the Magnetic Silencing Facility, Naval Submarine Base, Bangor, Washington. The purpose of the underwater assessment is to provide a generalized structural condition and repair requirements report on the designated facilities within the activity.

A description of the facility, it's location and mission is provided. Detailed results with respect to individual piling, troughs and overall assessment of structural condition and recommendations are also given.

1.6 DEFINITIONS: LEVEL I, II AND III INSPECTIONS

The following levels of inspection are to be construed only as general guidelines and not specific task procedures. Within the description of any specific task, the level and complexity required in an inspection will probably be a blend or combination of the different levels of inspection. Specific task descriptions will use these definitions as a reference.

Level I: General Inspection: This type of inspection is essentially a "swim-by" overview, which does not involve cleaning of any structural elements, and can therefore be conducted much more rapidly than the other levels of inspection. The level I inspections should confirm as-built structural plans and detect obvious major damage or deterioration due

to overstress (ship impact, ice), severe corrosion, or extensive biological growth and attack. The underwater inspector shall rely primarily on visual and/or tactile observations (depending on water clarity) to make condition assessments. These observations are normally made over the specified exterior surface area of the underwater structure whether it is a quaywall, bulkhead, seawall, pile, or mooring. Visual documentation (utilizing underwater television and/or photography), may be included with the quantity and quality adequate for documentation of the findings which will be representative of the facility condition.

Level II: Detailed Inspection: This type of inspection is directed toward detecting and describing damaged/deteriorated areas which may be hidden by surface biofouling or deterioration and toward obtaining a limited amount of deterioration measurements. These data should be sufficient to enable gross estimates to be made of facility load capability. Level II inspection will often require cleaning or structural elements. Since cleaning is time consuming it is generally restricted to areas that are critical or which may be representative of the entire structure itself. The amount and thoroughness of cleaning to be performed is governed by what is necessary to discern the general condition of the overall facility. Simple instruments such as calipers, measuring scales, and ice picks are commonly used to take physical measurements. However, a small percentage of more accurate measurements may also be taken with more sophisticated instruments for several reasons. These measurements will validate large numbers of simple measurements and in some hard-to-measure areas will actually be easier and faster to obtain.

Where the visual scrutiny, cleaning, and/or simple measurements reveal extensive, deterioration, a small sampling of detailed measurements will enable gross estimates to be made of the structure's integrity. For example, on extensively corroded steel H-piles a small percentage should receive ultrasonic thickness measurements to determine typical cross-section profiles. The cross-sections determined by these spot checks would be used to determine individual H-pile load capability which would then be extrapolated to obtain a "ballpark" estimate of overall facility load capability. Visual documentation (utilizing underwater television and/or photography) should be included with the quantity and quality adequate to be representative of the range of facility damage/deterioration.

LEVEL III: Highly Detailed Inspection: This type of inspection will often require the use of Non-Destructive Testing (NDT) Techniques, but may also require the use of partially destructive techniques such as sample coring thorough concrete and wood structures, physical material sampling, or in-situ surface hardness testing. The purpose of this type of inspection is to detect hidden or interior damage, loss in cross-sectional area, and material homogeneity. A Level III insepction will usually require prior cleaning. The use of NDT techniques are generally limited to key structural areas, areas that may be suspect or to structural members which may be representative of the underwater structure. Visual documentation (utilizing underwater television and or photography) and a sampling of physical measurements should be included with quantity adequate for documentation of the findings which will be representative of the facility condition.

SECTION 2 - ACTIVITY DESCRIPTION

2.1 NAME OF ACTIVITY

Trident Refit Facility, Bangor, Washington

2.2 LOCATION OF ACTIVITY

The Trident Refit Facility is located at the Naval Submarine Base on Kitsap Peninsula in Puget Sound, due west of Seattle, Washington. The site is rural in nature and the nearest urban areas are Silverdale, Poulsbo and Keyport, with approximate populations of 1,000, 1,700 and 500 respectively. The Greater Seattle Metropolitan area with a population of approximately 500,000 is about one hour east by ferry and highway. Bremerton, site of the existing Naval Shipyard, is located 13 miles south of the Bangor Annex. The Naval Torpedo Station, Keyport, is located four miles east of the Submarine Base.

2.3 DESCRIPTION OF ACTIVITY

This activity maintains waterfront facilities which provide the interface between the submarines and the shore support activity. The task under the current contract covers only the Magnetic Silencing Facility Deperming Pier.

The Deperming/Degaussing area provides the facilities to detect and remove the magnetic forces in the submarine. The facility consists of two principal components, the Deperming Pier and the Degaussing Range. The Deperming Pier is a non-magnetic wood pile pier adequate in size to berth a TRIDENT submarine and is equipped to remove magnetic forces which develop in the submarine. This project was carried out to inspect the wood marine piles, from mudline to cap, and to establish the "as built" base line conditions of the facility.

SECTION 3 - INSPECTION PROCEDURE

An underwater inspection and nondestructive testing was carried out of in-place timber piles and timbers of the cable assembly support troughs in the Deperming Pier of the Magnetic Silencing Facility, Naval Submarine Base, Bangor, Washington, during the week of June 4, 1984.

3.1 LEVEL OF INSPECTION

A Level I and III inspection was carried out of timber piles as specified under Task 1 of this contract. A Level I general inspection was carried out of the troughs supporting the cables in the bay between the east and west finger piers.

3.2 INSPECTION PATTERN/SCOPE OF WORK

A Level I general inspection and Level III ultrasonic testing was carried out on the 254 piles not included in the previous inspection carried out in 1980 Underwater Inspection Report Number FPO-1-80-(13), October, 1980. This includes piles in the approachway trestle, the header pier and the east and west finger piers. This report and the previous report cover all piles in the Deperming Pier. The current piling plans and Tables 1, 3 and 4 show results from both projects. (Tables are in Appendix)

In addition to the piles a Level I inspection was carried out of the 30 X-loop cable troughs extending between the finger piers. These troughs consist of two treated (approx. 14-16" diameter) timber poles each with timber cross members on the under side. The poles are attached to structural piles in the east and west finger piers.

In addition to the inspection, measurements were obtained from the underside of the troughs to the mudline on every other trough.

3.3 INSPECTION PROCEDURE

3.3.1 Equipment

- B.C. Research ULTRASCAN PTM-4*, pile testing instruments.
- Underwater telephone.
- Nikonos II Camera with Metz GN41 Strone in Underwater Housing.
- Calipers
- Miscellaneous ancillary equipment and SCUBA equipment.
- See Photographs 1 and 2 for ULTRASCAN PTM-4 instruments, in appendices.

* Patented

SECTION 4 - FACILITY INSPECTED

4.1 FACILITY INSPECTED

Deperming Pier, Magnetic Silencing Facility (MSF), Naval Submarine Base, Bangor, Washington.

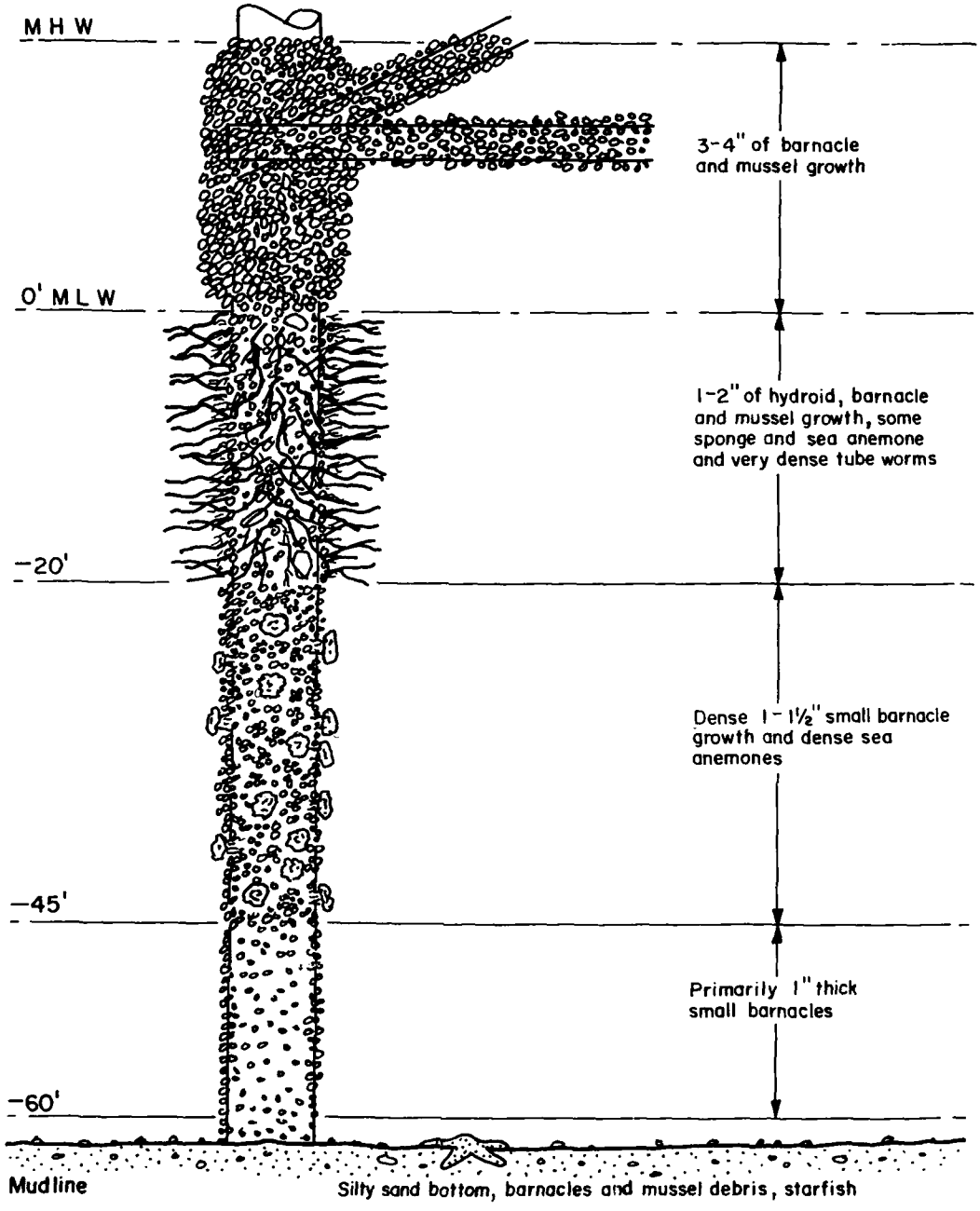
The results of this inspection are detailed in this section of the report. The discussion of the facility is presented in four sections: (1) A description of the overall facility and its operations as well as a specific detailing of the construction and identification of the examined piles; (2) A detailing of the observed condition of the facility as determined by the field inspection; (3) A quantitative assessment of the structural condition of the facility based on the observed condition; and (4) Recommendations for maintenance to ensure the structural integrity of the facility. Tables detailing the condition of the inspected piles as well as cost breakdowns for any necessary repairs are included in the accompanying appendices.

Water depths ranged up to 65 feet at the north end of the finger piers. Underwater visibility during the inspection ranged from two to five feet.

Extensive marine fouling growth was found throughout the inter-tidal and immersed zones with observed significant increase in growth since the 1980 inspection. Specifically the fouling growth pattern was as follows:

Inter-Tidal zone	-	Dense barnacle and mussel growth.
Upper immersed zone (0' to -20')	-	Primarily dense tubeworms also hydroids, barnacles, mussels, sea anemones and sponges.
Lower immersed zone (-20' to -45')	-	Dense, 1" - 1½", barnacle growth and dense sea anemones.
Mudline	-	Primarily dense barnacle cover.

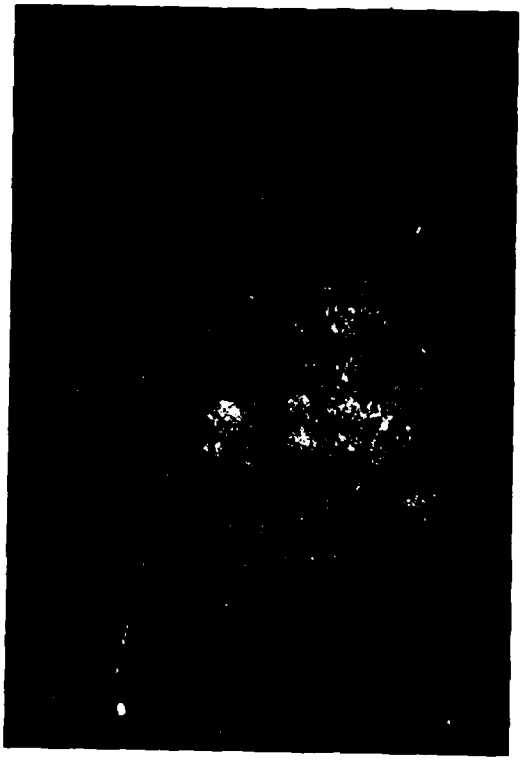
The following Figure 4 and Photograph Nos.1 to 5 illustrate the typical conditions found.



J. Agi & Associates Co. Ltd. Suite 600, 1414 Alaskan Way, Seattle, WA	CHESDIV NAV FAC ENG COM MARINE GROWTH PROFILE MAGNETIC SILENCING FACILITY BANGOR, WA.	Fig. 5
Not to scale June, 1984.		

PHOTOGRAPH No. 1

Typical mussel and barnacle fouling found in the intertidal zone.

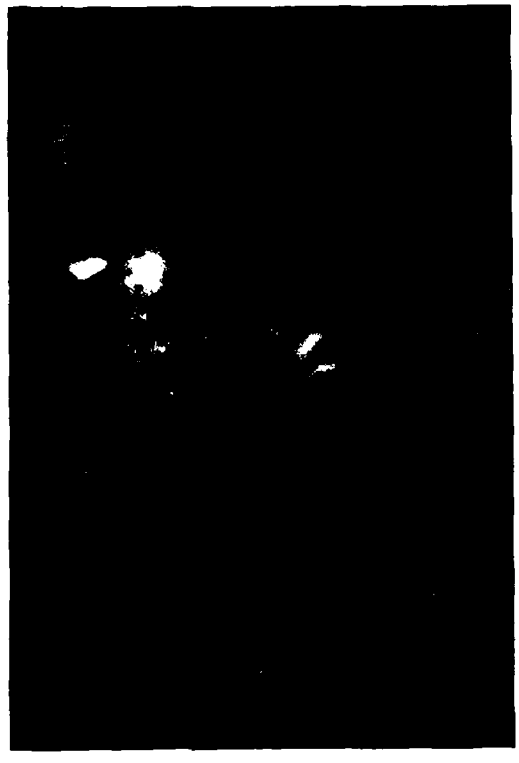


PHOTOGRAPH No. 2

Typical fouling in the lower intertidal zone.

PHOTOGRAPH No. 3

Marine fouling, tubeworms, sea anemones, barnacles and hydroids found in the upper immersed zone.



PHOTOGRAPH No. 4

Dense small barnacles and sea anemones found in the lower immersed zone.

PHOTOGRAPH No. 5

Dense small barnacle growth and occasional sea anemones found on piles in vicinity of mudline.

4.2 FACILITY DESCRIPTION

The Magnetic Silencing Facility is located at the extreme north end of the Naval Submarine Base, Bangor. The structure extends out approximately 700 feet perpendicular to the shore. A 567 foot long by 15 foot wide Access Trestle joins a Header Pier and the 730 foot by 15 foot East and 745 by 15 foot West Piers. The entire structure is constructed of treated Douglas Fir piles in accordance with ASTM D25 specifications. The pile bents in the Access Trestle are composed of four and six piles each. The bents are numbered one through 29.5 from the shore and the pile rows are designated by consecutive numbers from the east. The Header Pier runs from Bent 30 to Bent 36.5 and the piles are designated by consecutive numbers from the "inside" of the pier. The West Pier runs from Bent 37W to 77W and the East Pier extends from Bent 30E to Bent 77E. In both piers the piles are numbered from the outside towards the center line of the pier. See the accompanying piling plans (Dwg.No.1) for overall layout and pile numbering.

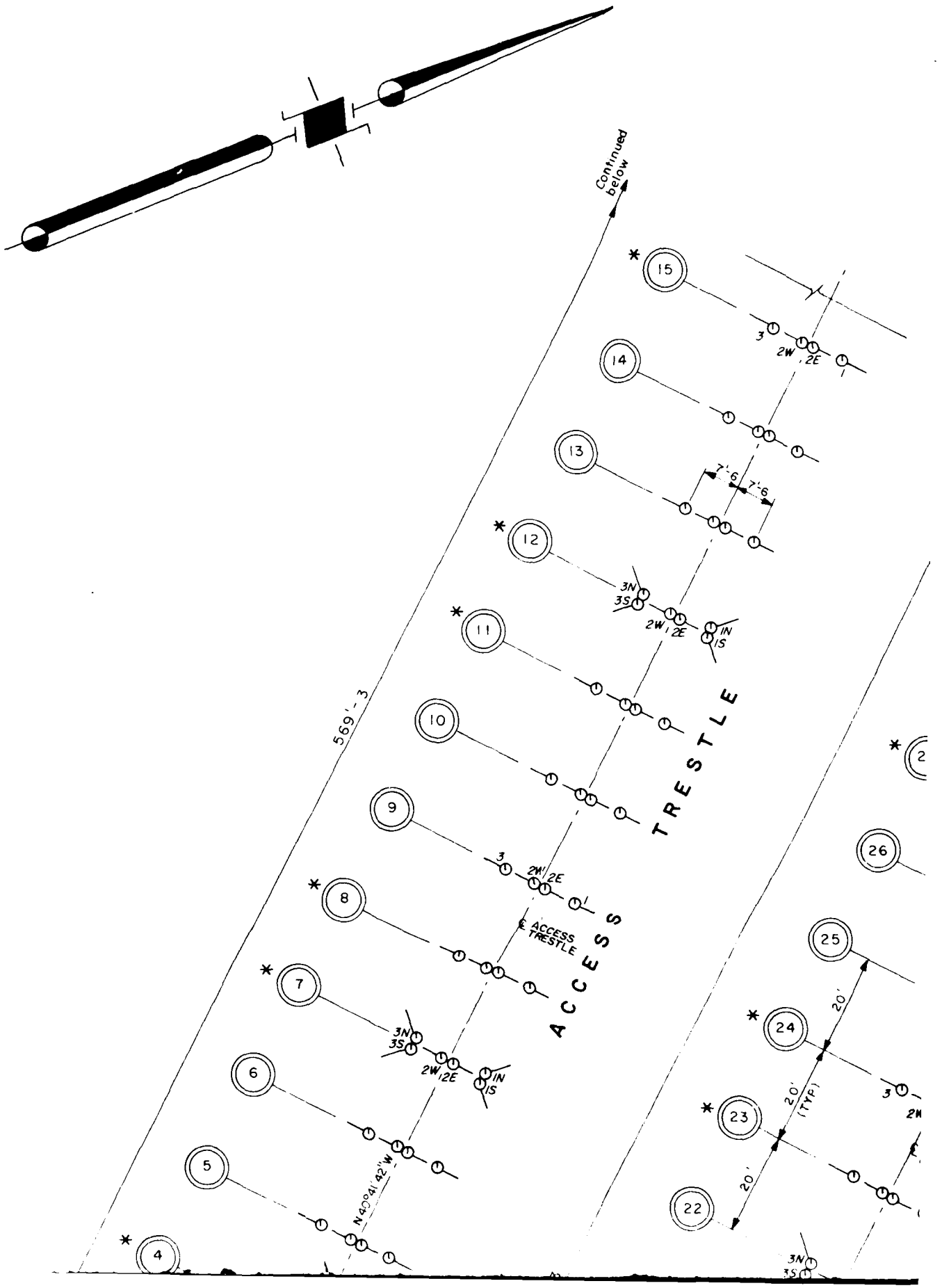
Extensive timber bracing extends down 12 feet from the pile tops. The Commercial Grade, No. 2, Douglas Fir-Larch bracing extends both with the rows and bents. (See Photograph 1.)

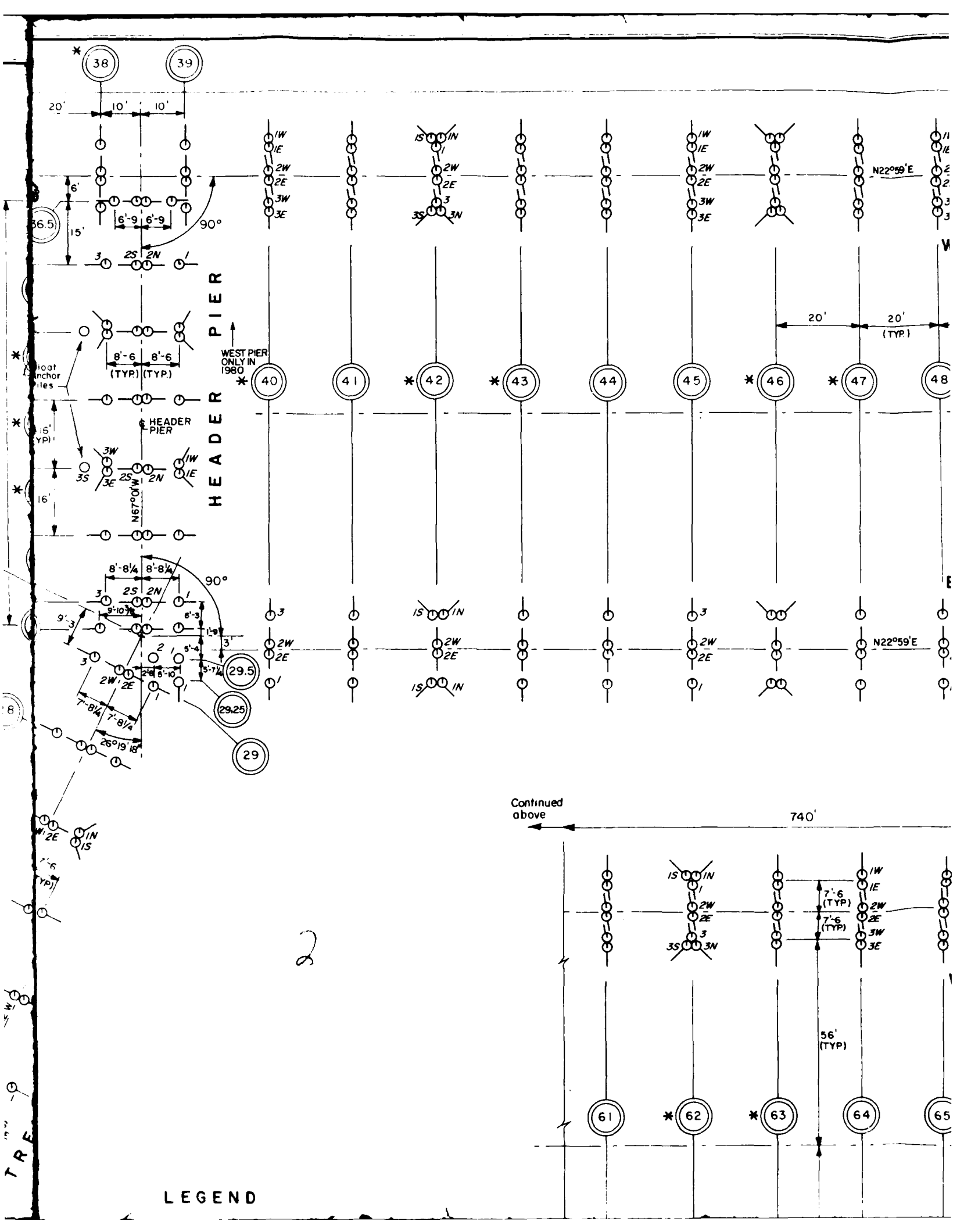
The mudline to cap pile lengths range from 35 feet in the approach to 75 feet in the piers. Mean pile diameter in the Access Trestle ranged from 11" to 15". The pile butt diameters ranged from 16" to 19" with the average being about 17". Pile lengths and diameters for the individual piles are given in Table 1.(See Appendix.)

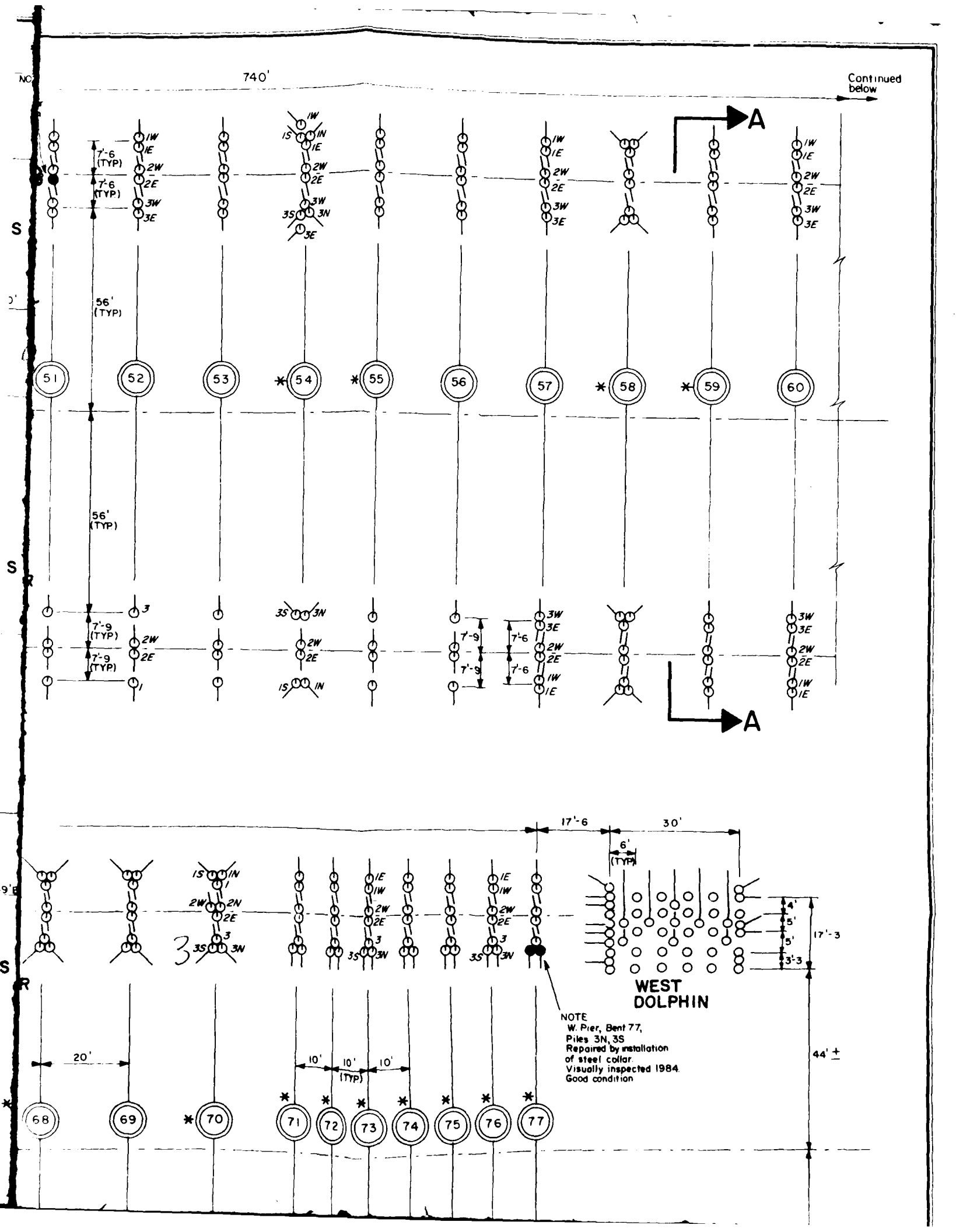
Maximum water depth encountered was approximately 65 feet (at MHW) at the north end of the East and West Piers. Underwater visibility ranged from two to five feet with some suspension turbidity encountered throughout the facility.

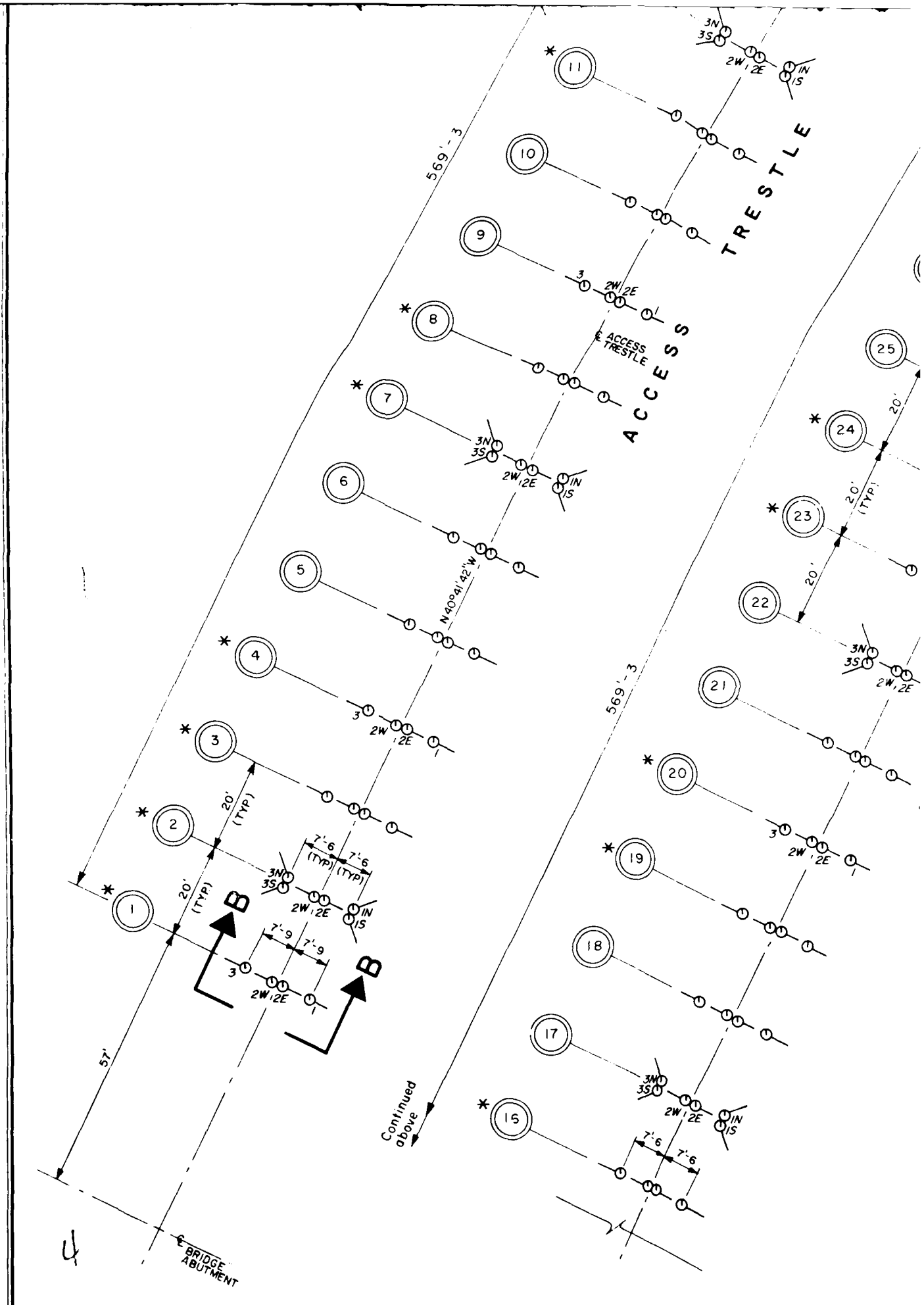
The two main piers, east and west, support the deperming mechanism. Above water this consists of cables extending between the piers supported by 50 foot poles on each pier. Underwater the cables are supported by troughs constructed of timber poles and cross-timbers. The cables rest inside these troughs with the troughs being attached to finger pier bents by timber framing. The troughs run above the mudline from 0' to -10'. Elevations of mudline/troughs are enclosed.

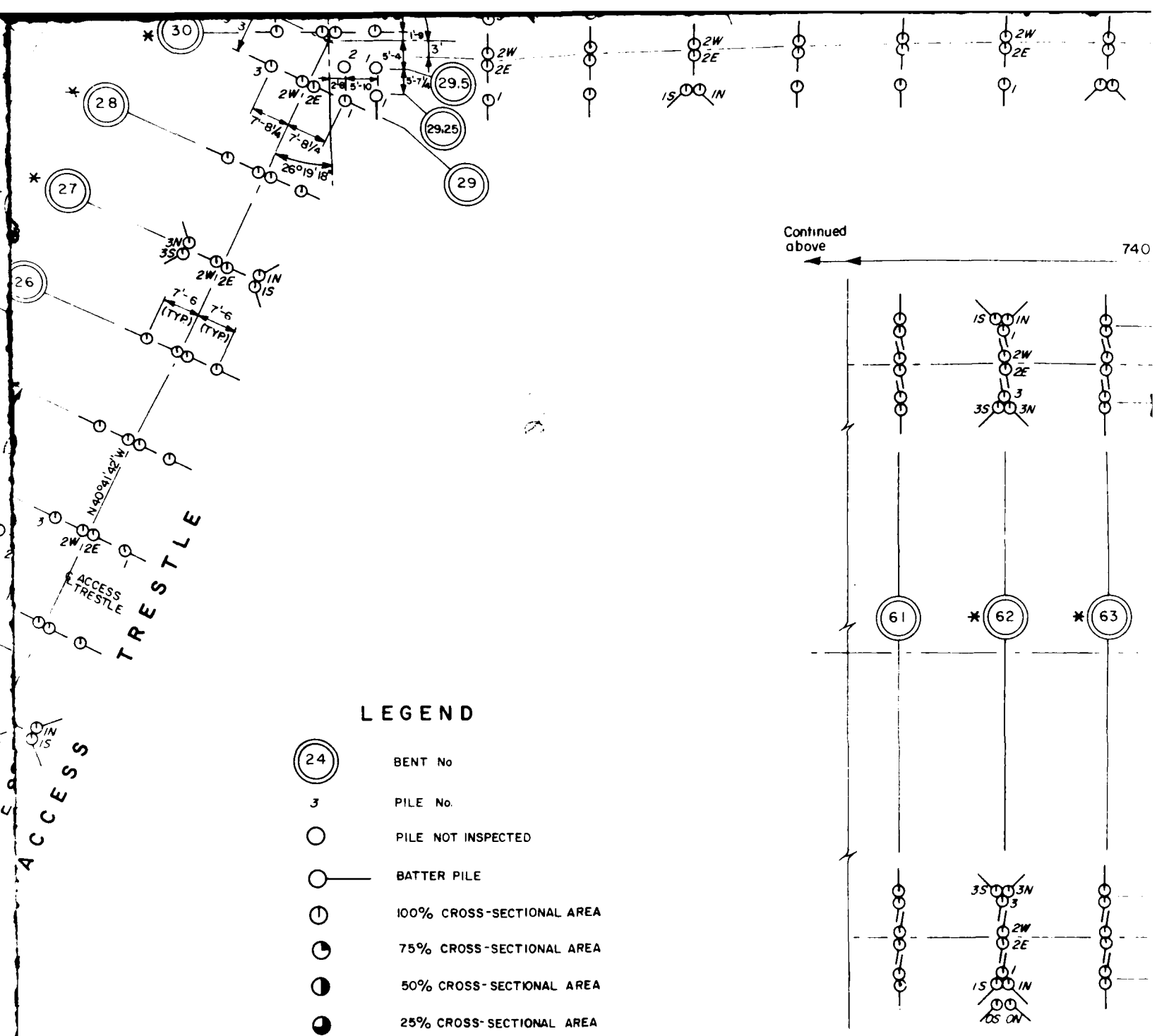
Construction of the facility was completed in 1978. Approximately two years ago pile dolphins were added to the outside ends of the finger piers. See the accompanying Drawings 1, 2 and 3 which are based on NAVFAC Drawings numbered 6045178, 6045179, 6045180, 6045186, 6045217, 6144576, for detailed layout. The accompanying photographs also illustrate various features of the facility.


Continued below
569'-3
ACCESS TRESTLE
℄ ACCESS TRESTLE
N42°04' 42"W
15
14
13
12
11
10
9
8
7
6
5
4
26
25
24
23
22
3
2W, 2E
7'-6
7'-6
3N
3S
2W, 2E
IN
IS
3
2W, 2E
1
3N
3S
2W, 2E
IN
IS
20'
20' (TYP)
20'
3N
3S


38
39
20'
10'
10'
6'
15'
6'-9
6'-9
90°
36.5
3
2S
2N
1
HEADER PIER
8'-6
8'-6
(TYP)
(TYP)
Float Anchor Piles
HEADER PIER
3W
3E
3S
2S
2N
1W
1E
N67°01'W
16'
8'-8¼
8'-8¼
90°
9'-3
9'-10⅜
6'-3
1'-9
3'
5'-4
5'-7½
2'-6
5'-10
29.5
29.25
29
7'-8¼
7'-8¼
26°19'18"
WEST PIER ONLY IN 1980
40
41
42
43
44
45
46
47
48
1S
1N
2W
2E
3
3S
3N
N22°59'E
20'
20'
(TYP)
Continued above
740'
7'-6 (TYP)
7'-6 (TYP)
56' (TYP)
61
62
63
64
65
LEGEND

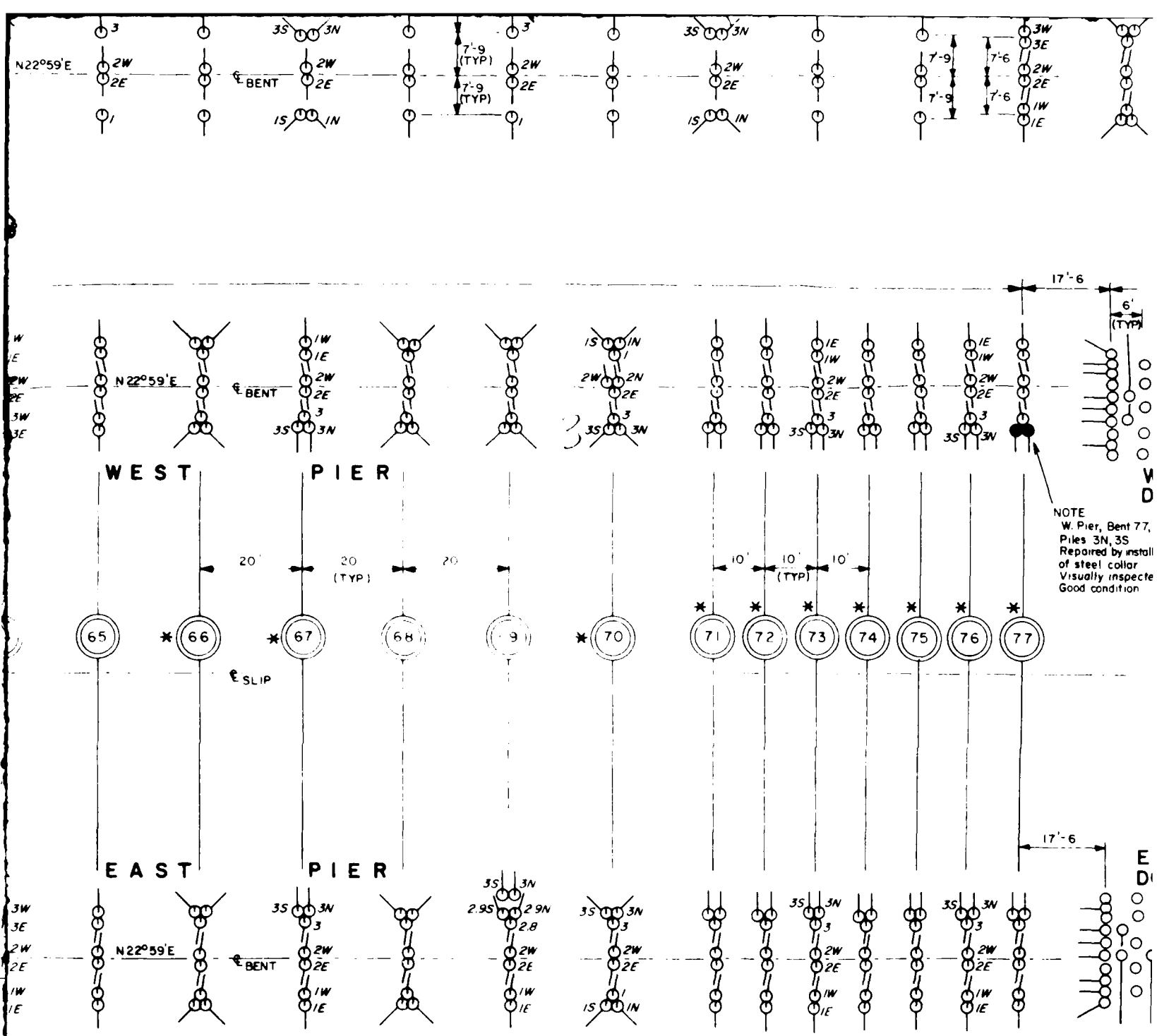

740'
Continued below
A
A
7'-6 (TYP)
7'-6 (TYP)
56' (TYP)
56' (TYP)
7'-9 (TYP)
7'-9 (TYP)
7'-9
7'-9
7'-6
7'-6
51
52
53
54
55
56
57
58
59
60
17'-6
30'
6' (TYP)
4'
5'
5'
3'-3
17'-3
WEST DOLPHIN
NOTE
W. Pier, Bent 77,
Piles 3N, 3S
Repaired by installation
of steel collar.
Visually inspected 1984.
Good condition
20'
10'
10'
10' (TYP)
44' ±
68
69
70
71
72
73
74
75
76
77


ACCESS TRESTLE
569'-3
569'-3
N40°41'42"W
20' (TYP)
20' (TYP)
20' (TYP)
20' (TYP)
7'-6 (TYP)
7'-6 (TYP)
7'-9
7'-9
7'-6
7'-6
51'
B
B
3N
3S
2W
2E
IN
IS
1
2
3
5
6
7
8
9
10
11
15
16
17
18
19
20
21
22
23
24
25
Continued above
℄ ACCESS TRESTLE
℄ BRIDGE ABUTMENT



LEGEND

(24)	BENT No
3	PILE No.
○	PILE NOT INSPECTED
○——	BATTER PILE
①	100% CROSS-SECTIONAL AREA
◔	75% CROSS-SECTIONAL AREA
◑	50% CROSS-SECTIONAL AREA
◕	25% CROSS-SECTIONAL AREA
●	0-25% CROSS-SECTIONAL AREA
m	PILE MISSING
NB	PILE NOT BEARING AT CAP
*	INDICATES BENT INSPECTED IN 1980.



Reference Drawings

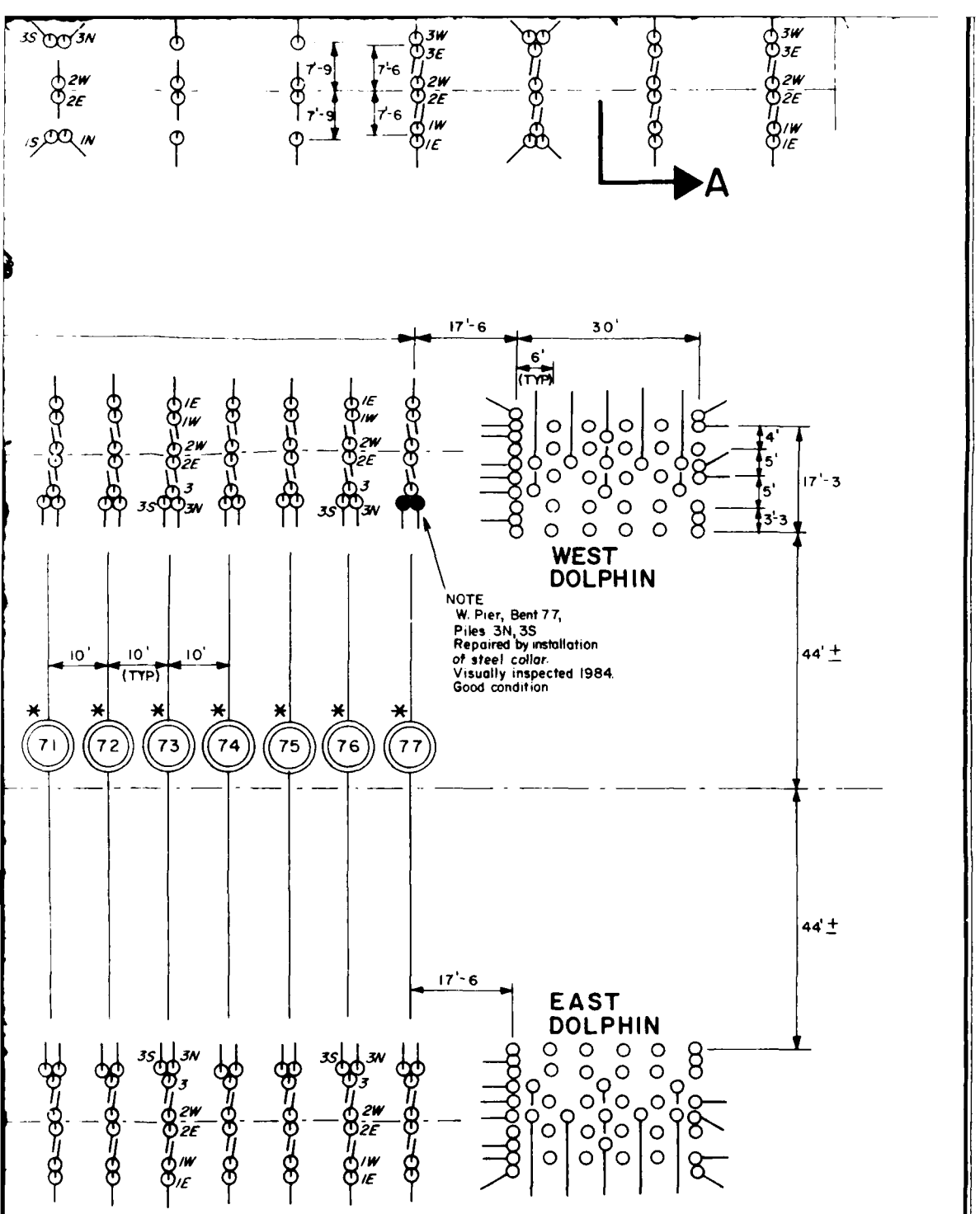
Navfac Dwg. No. 6045179
" " " 6045180
" " " 6144576

J. AGI & ASSOCIAT
Suite 600, 1414 Alaskan Way, Seat

PLAN SHOWING LOCATION
AND CONDITION OF INSPECTED PIL
DEPERMING PIER
TRIDENT REFIT FACILITY
BANGOR, WASHINGTON

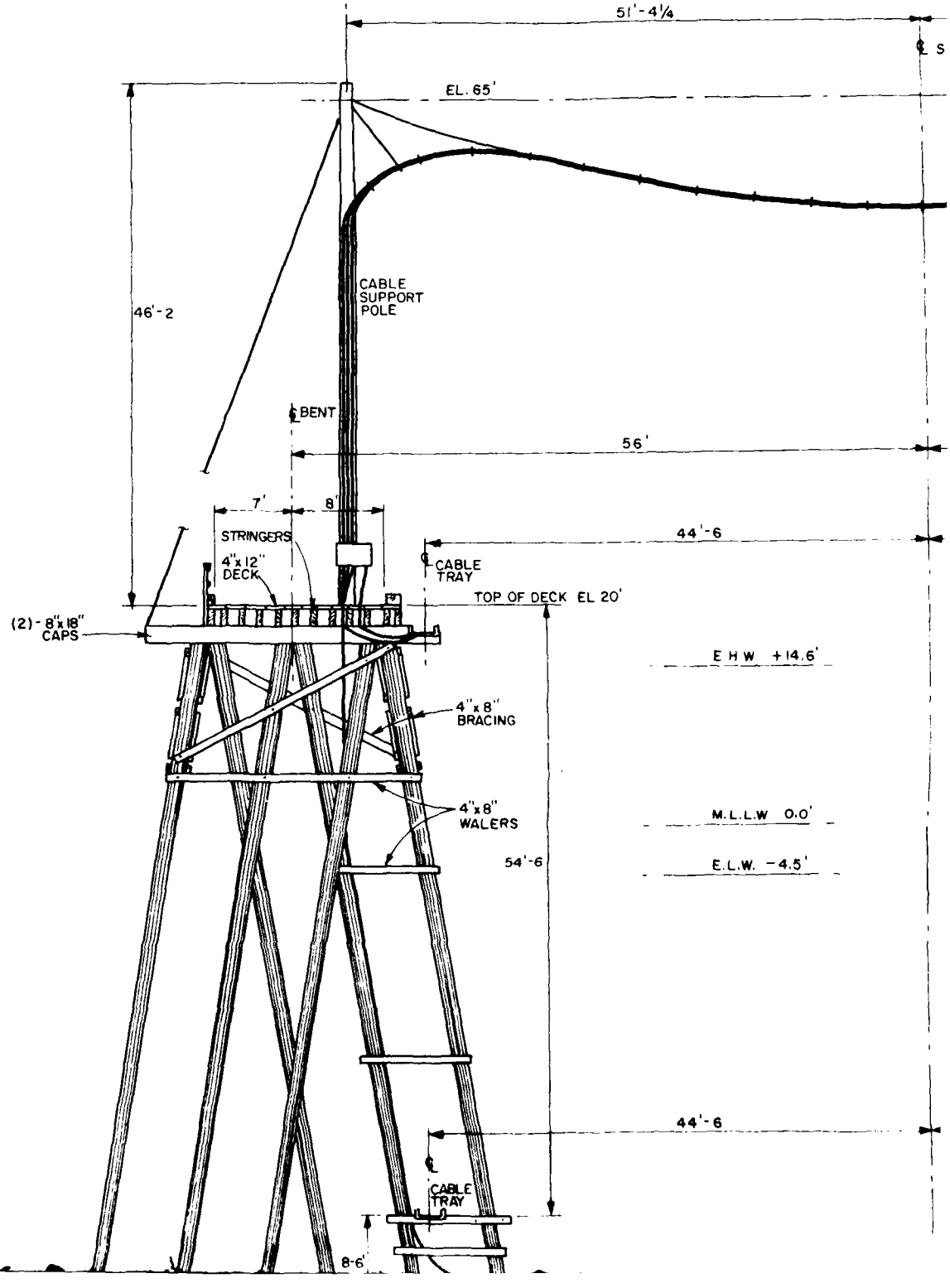
CHESDIV NAV FAC ENG COM
REPORT No. FPO-1-84-(1
CONTRACT No. N62477-84-D-(
TASK 1

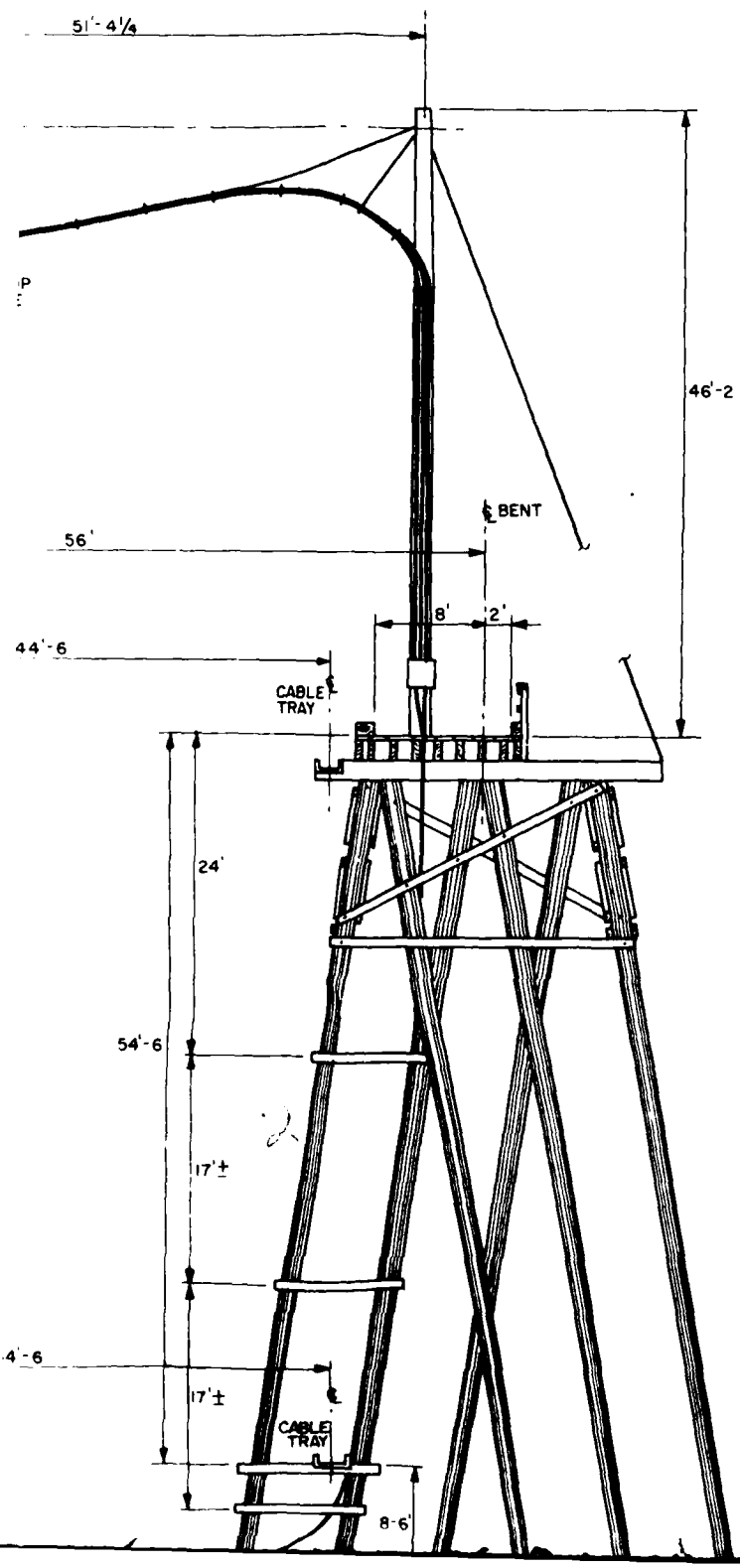
DWG No. 1



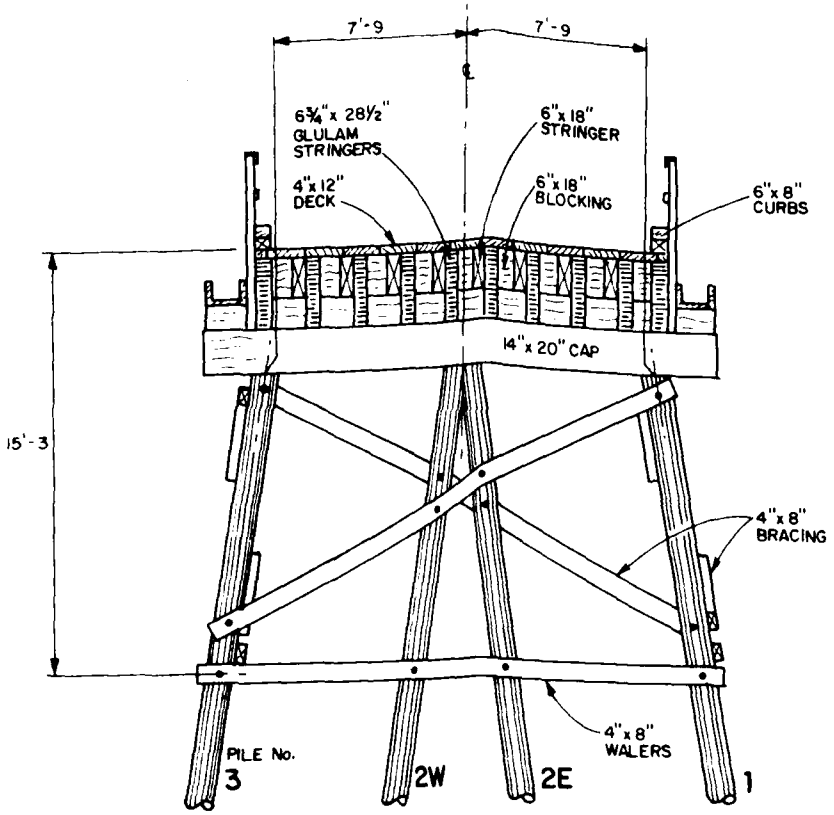
J. AGI & ASSOCIATES Suite 600, 1414 Alaskan Way, Seattle, WA	SCALE 1" = 20'
	DRAWN FP
	CHECKED EBV
	APPROVED EBV
	DATE JULY 19, 1984.
PLAN SHOWING LOCATION AND CONDITION OF INSPECTED PILES IN DEPERMING PIER TRIDENT REFIT FACILITY BANGOR, WASHINGTON CHESDIV NAV FAC ENG COM REPORT No. FPO-1-84-(15) CONTRACT No. N62477-84-D-0024 TASK 1 **DWG No. 1**	PROJECT No **84-1-2-153**

045179
045180
144576


51'-4 1/4
℄ S
EL. 65'
46'-2
CABLE SUPPORT POLE
℄ BENT
56'
7'
8'
44'-6
STRINGERS
4"x12" DECK
℄ CABLE TRAY
TOP OF DECK EL 20'
(2)-8"x18" CAPS
E H W +14.6'
4"x8" BRACING
4"x8" WALERS
M.L.L.W 0.0'
54'-6
E.L.W. -4.5'
44'-6
℄ CABLE TRAY
8'-6"

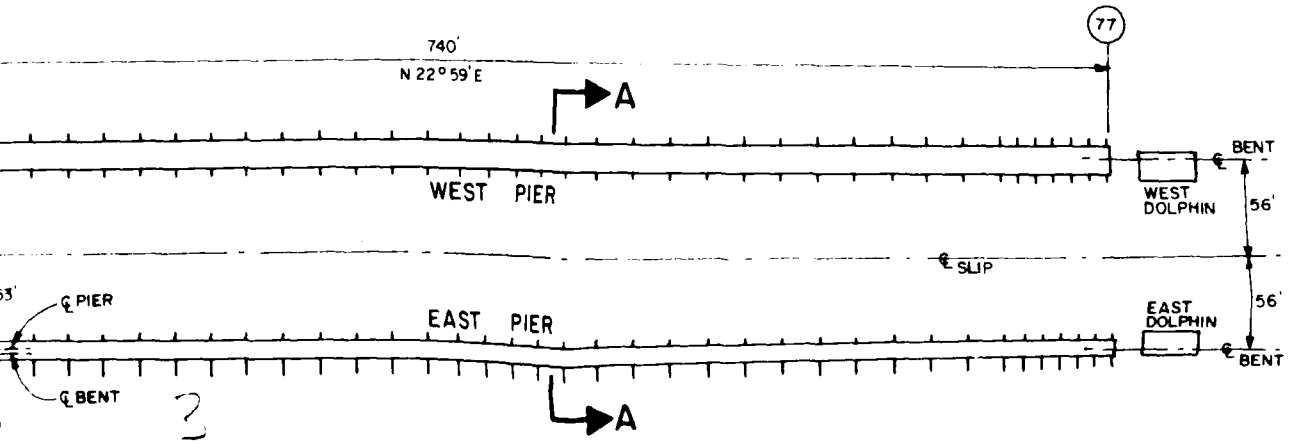


36
HE
30



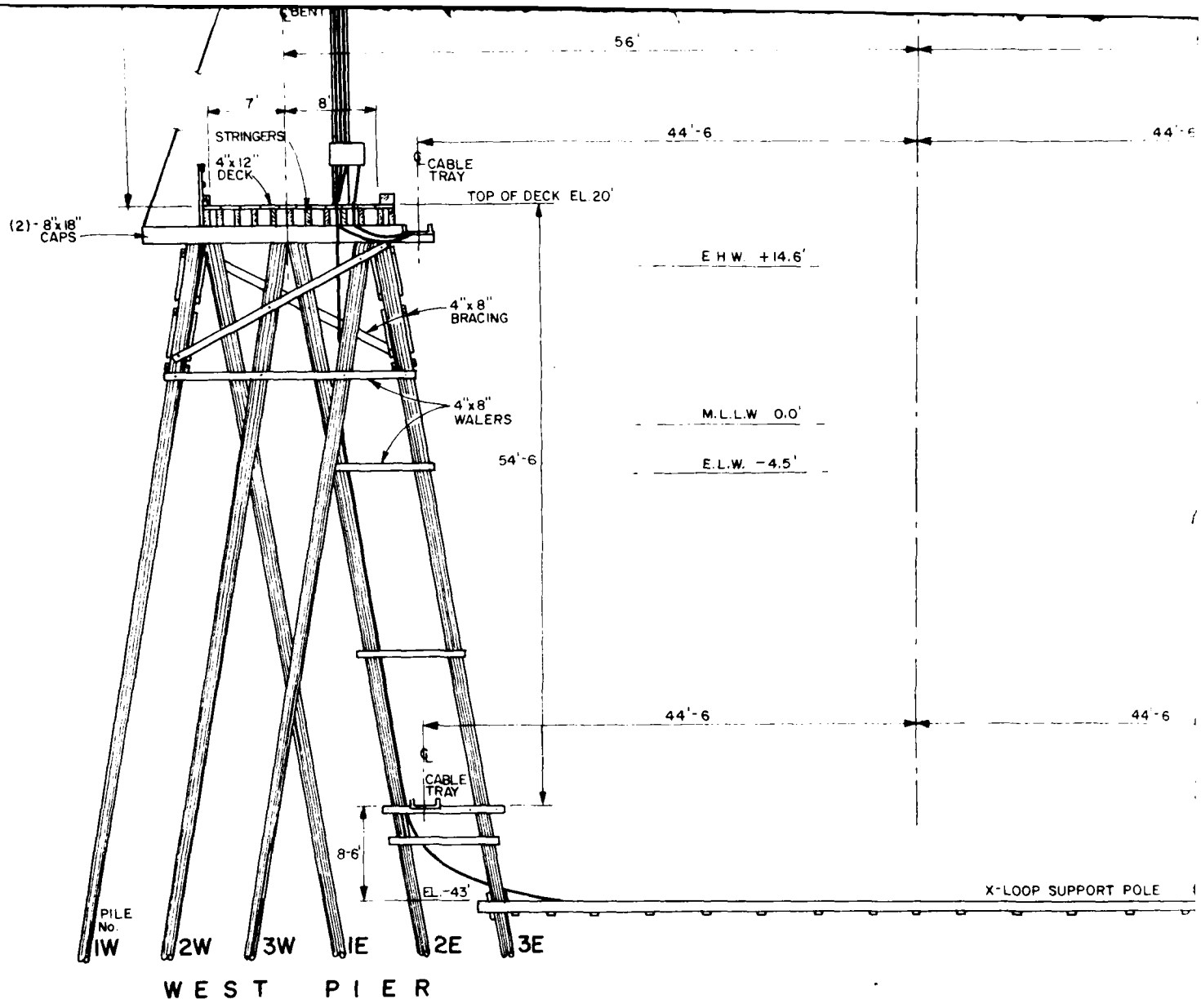
SECTION B-B
ACCESS TRESTLE - BENT 1

3/16" = 1'-0



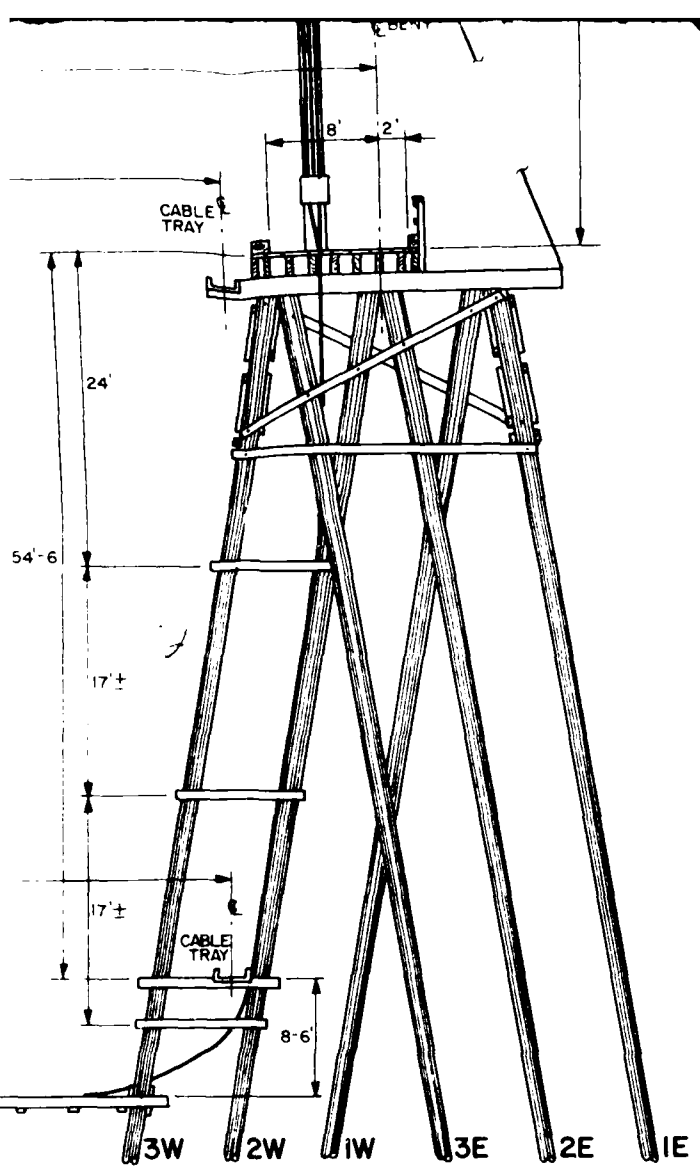
SITE PLAN

1" = 80'

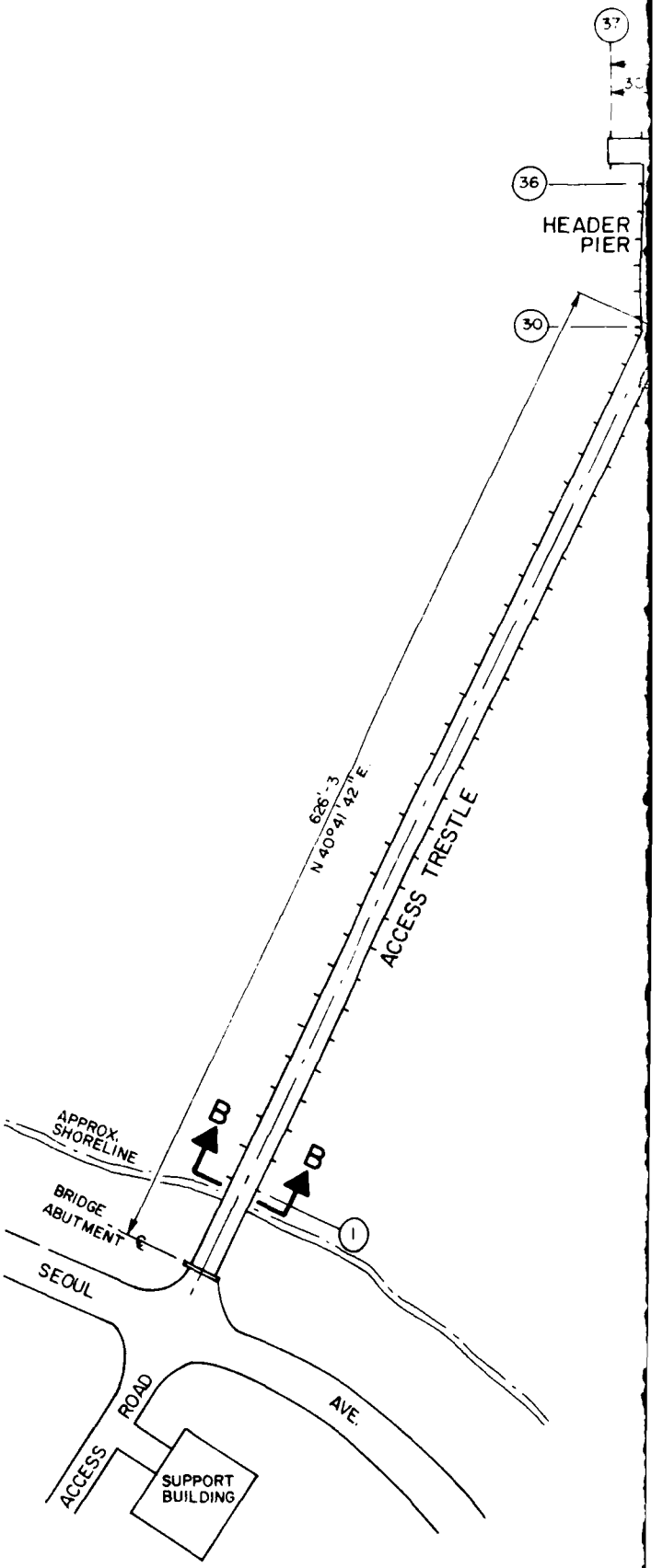


SECTION A-A
EAST & WEST PIERS - BENT 59

3/32" = 1'-0

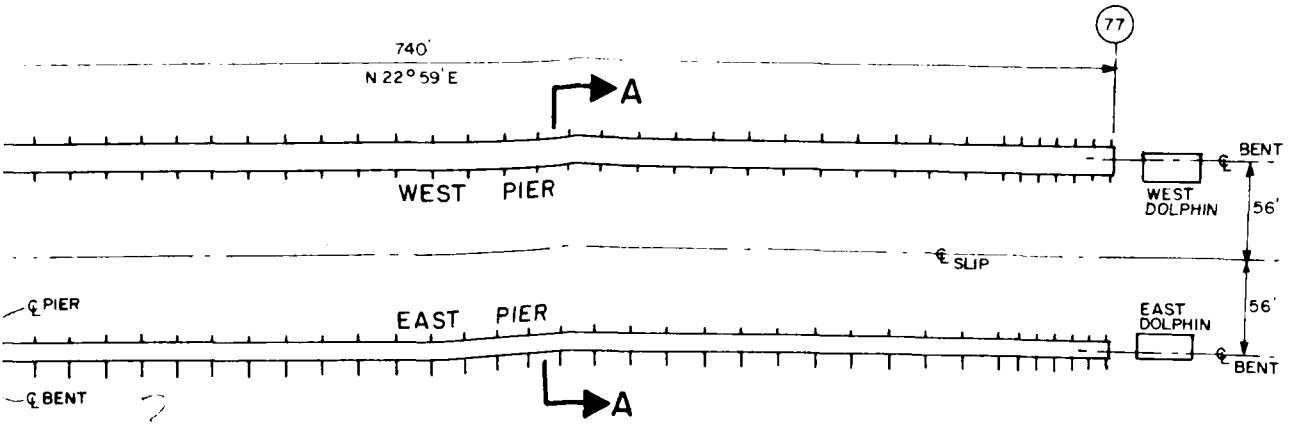

8'
2'
CABLE TRAY
24'
54'-6
17'±
17'±
CABLE TRAY
8'-6'
3W
2W
1W
3E
2E
1E

EAST PIER

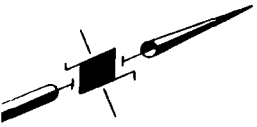

37
36
HEADER PIER
30
626'-3
N 40°41'42" E.
ACCESS TRESTLE
APPROX. SHORELINE
B
B
BRIDGE ABUTMENT
1
SEOUL
ROAD
AVE.
ACCESS
SUPPORT BUILDING

ACCESS TRESTLE BENT 1

3/16" = 1'-0



2



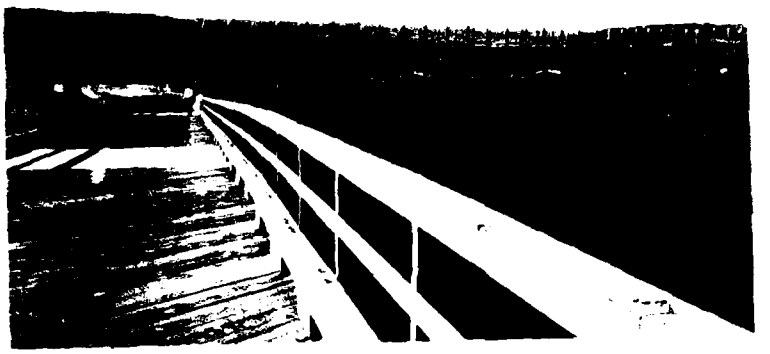
SITE PLAN

1" = 80'

Reference Drawings

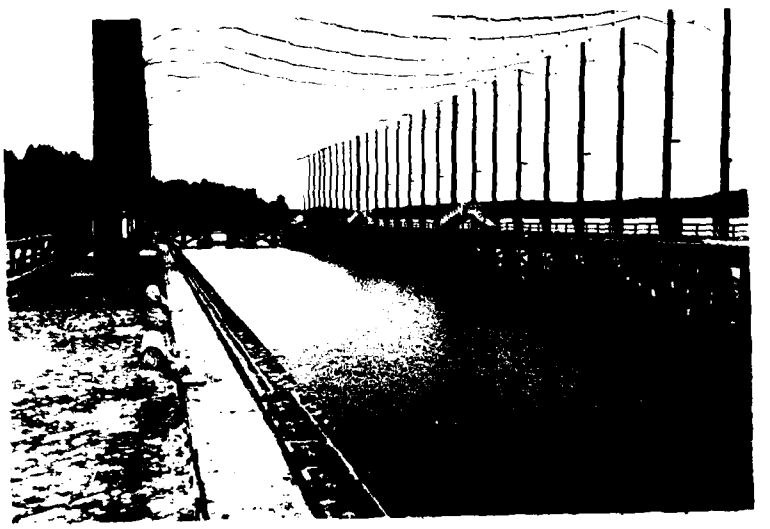
Navfac Dwg. No. 6045178
" " " 6045186
" " " 6045217

J. AGI & ASSOCIATES Suite 600, 1414 Alaskan Way, Seattle, WA	SCALE AS SHOWN DRAWN F P CHECKED APPROVED DATE JULY 20, 1984
PLAN SHOWING TYPICAL SECTIONS AND SITE PLAN DEPERMING PIER TRIDENT REFIT FACILITY BANGOR, WASHINGTON CHESDIV NAV FAC ENG COM REPORT No. FPO-1-84-(15) CONTRACT No. N62477-84-D-0024 TASK 1 **DWG. No. 2**	PROJECT No **84-1-2-153**



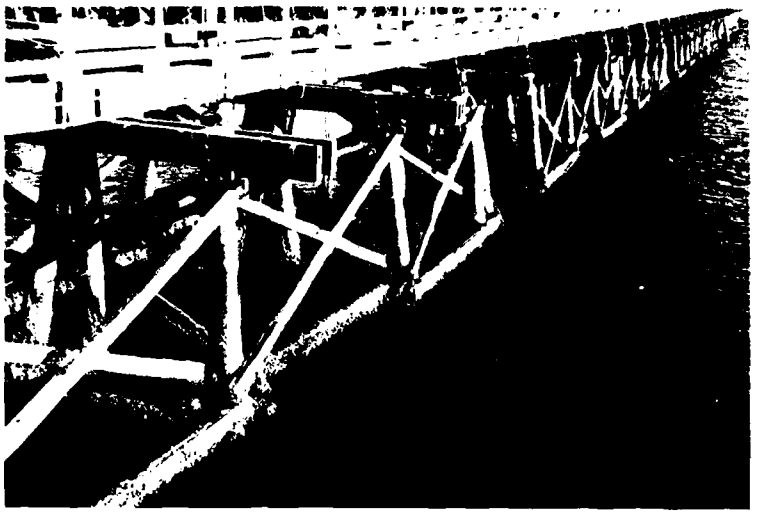
PHOTOGRAPH No. 6

Overview of the Deperming Pier at the Magnetic Silencing Facility, Bangor, Washington.



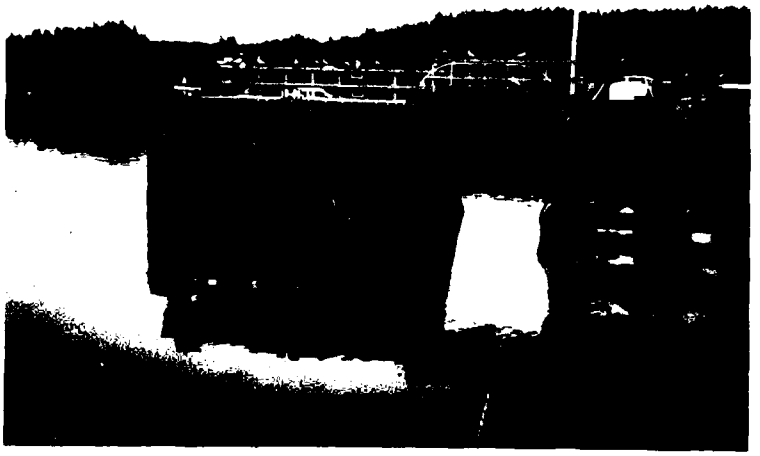
PHOTOGRAPH No. 7

East and West Piers of the Deperming Pier - looking south towards the Header Pier.



PHOTOGRAPH No. 8

Typical timber brace framing of piling in the Deperming Pier.



PHOTOGRAPH No. 9

Pile dolphins added to outside (north) end of finger piers.

4.3 OBSERVED INSPECTED CONDITION

4.3.1 Piles

The detailed inspection results showing piles examined and their condition are presented in Tables 1 and 2 and illustrated graphically on the preceding drawings.

The overall condition of the piles is excellent. Of the 254 piles examined, 250 piles are undamaged and are rated 100% residual cross-sectional area. Four piles have sustained minor mechanical damage in the form of "shakes" or narrow slivers breaking off of the pile surface. In piles 29-2W Access Trestle and 60-1W West Pier this mechanical damage has allowed some *Bankia* attack and entry, (See Photograph Nos. 10 and 11.) Piles 9-1 Access Trestle and 60-3E West Pier have sustained mechanical damage but no marine borer attack. Four additional piles (see Table 1) have sustained minor mechanical damage with no breaching of the creosote treated shell and no marine borer attack.

4.3.2 X-Loop Troughs

The overall condition of the 30 trough assembly members covered by this inspection, is good. No damage was found in the timber poles that span the gap between the piers or in the timber cross members which span the twin trough poles and support the three X-Loop cables. (See Photograph No. 12).

Marine borer damage, *Limnoria* and *Bankia* was found in the framing timbers which attach the trough poles to the finger pier bents. Evidence of this type of damage was noted throughout the finger piers, particularly in the East finger pier. (See Photograph No. 13). Should this damage progress from the cut end to the attachment bolt, the connection will be rendered ineffectual.

The mudline appears to slope down from the East to West pier. Every other trough was measured for mudline to bottom of trough distance. In some cases the trough poles are imbedded in the mudline under the East Pier with generally a 10-13 foot space under the West Pier. All troughs are uniformly horizontal and parallel hence the elevation profiles in Drawing 3 reflect the slope of the mudline for each measured trough.

4.3.3 Miscellaneous

In addition to the above noted results, other observations were made.

Incipient *Limnoria* attack was observed in some cut ends of wales and cross-bracing timbers. (See Photograph No.14).

A general increase in marine fouling organisms was observed since the 1980 inspection. This fouling is not only attached to timber members but also to cable assembly bundles. (See Photograph No. 15).

Extensive *Bankia* damage was found in various cable assembly timbers. (See Photograph Nos. 16 and 17).

PHOTOGRAPH No. 10

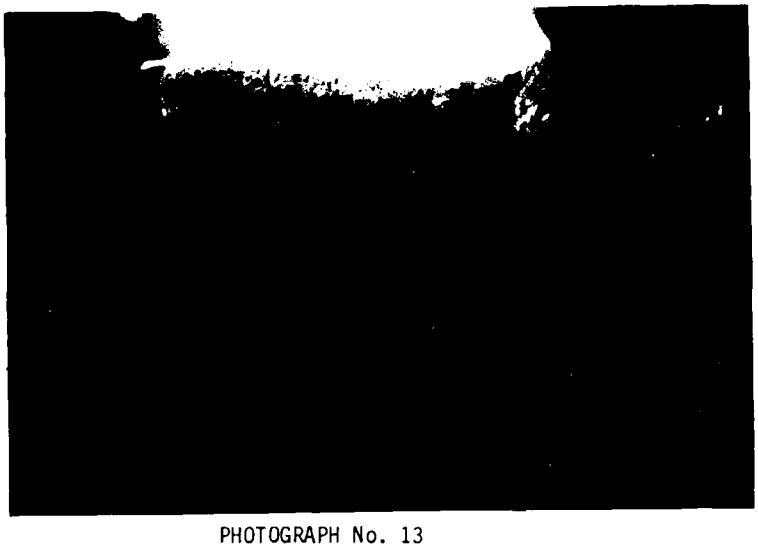
Pile 60-1W of West Pier. 2% mechanical shake and Bankia attack.

PHOTOGRAPH No. 11

Close-up of pile 60-1W showing Bankia entrance holes (tunnels).

PHOTOGRAPH No. 12

X-Loop Trough. Note minimal fouling growth on X-Loop Cables running through trough.

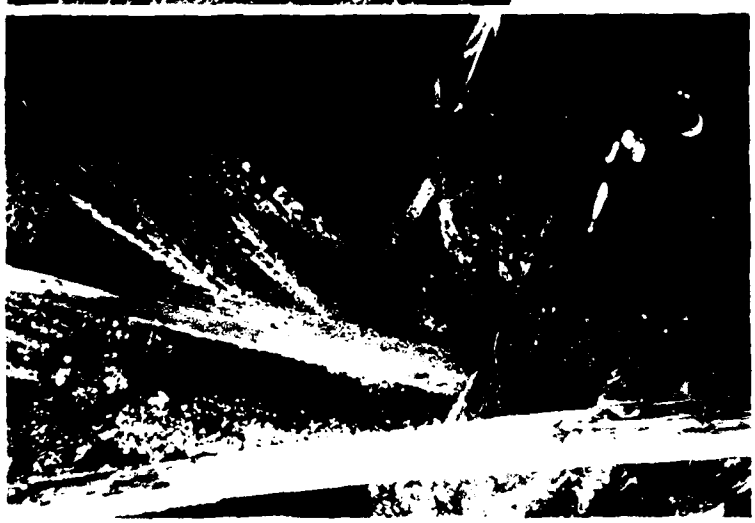


PHOTOGRAPH No. 13

X-Loop Trough framing timber. Note heavy marine borer damage to cut-off end.

PHOTOGRAPH No. 14

Diagonal timber brace with fouling organisms removed to show incipient Limnoria attack.

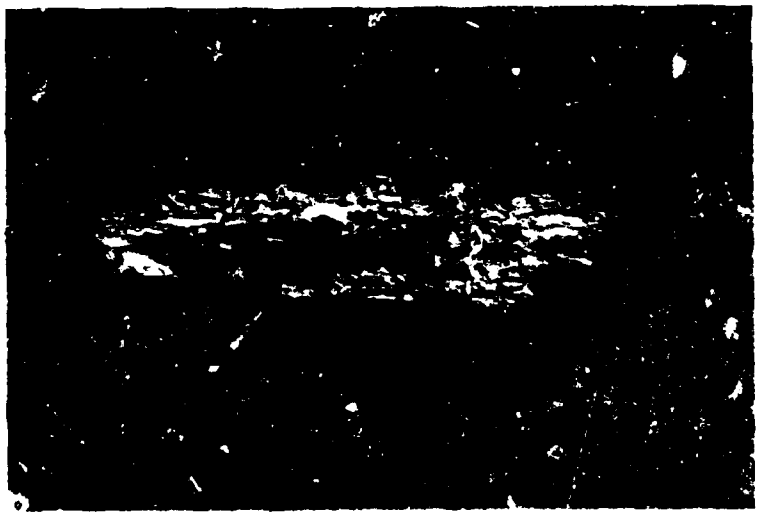


PHOTOGRAPH No. 15

Extensive marine growth in the intertidal zone on cable assembly bundles.

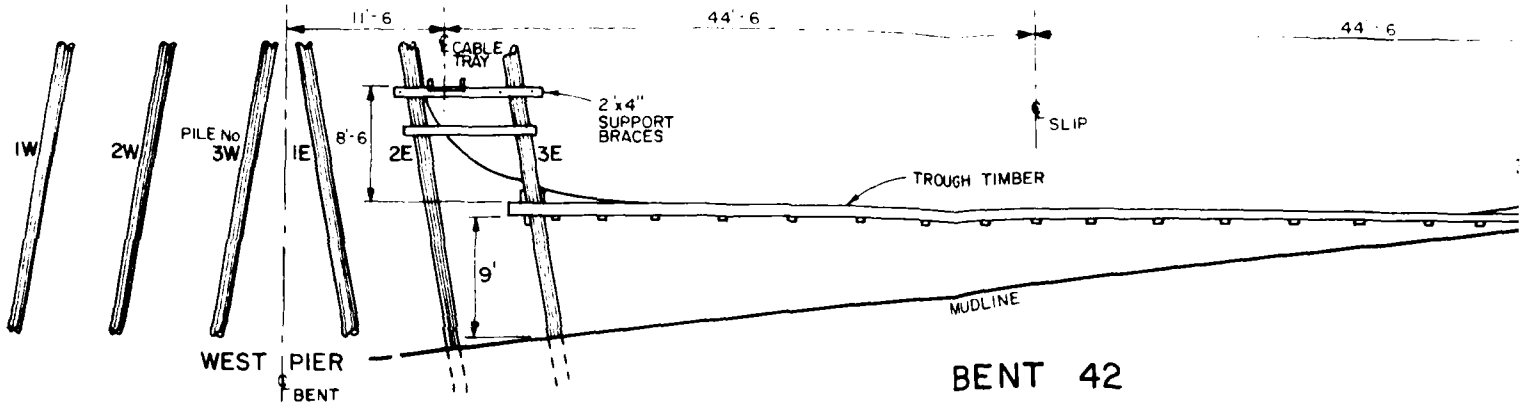
PHOTOGRAPH No. 16

Cable support/restraining timbers at Bent 40 of East Pier. Note extensive Bankia damage.

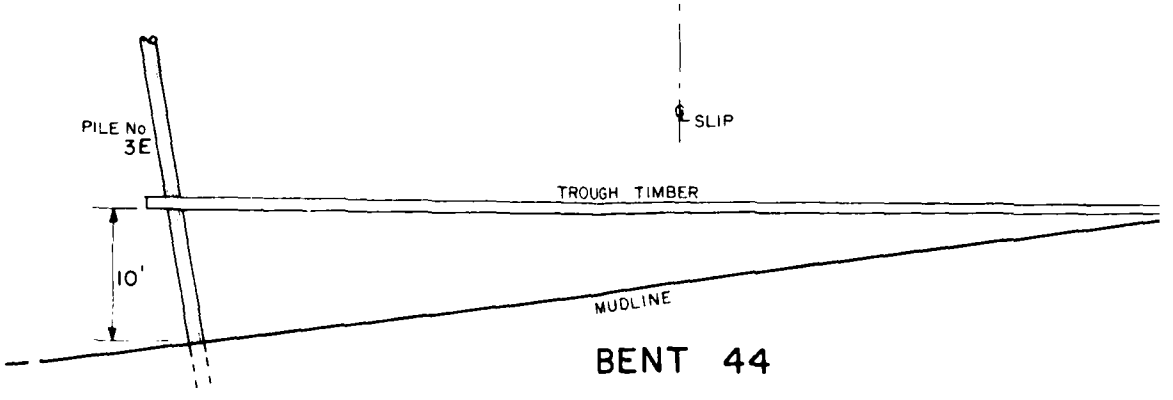


PHOTOGRAPH No. 17

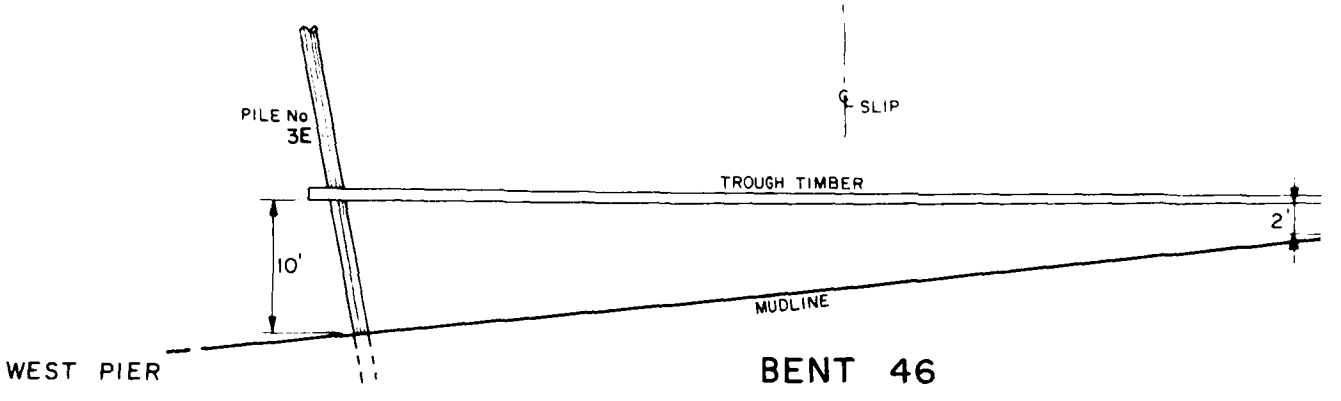
Sample of cable support timber showing destruction by the internal marine borer, Bankia.



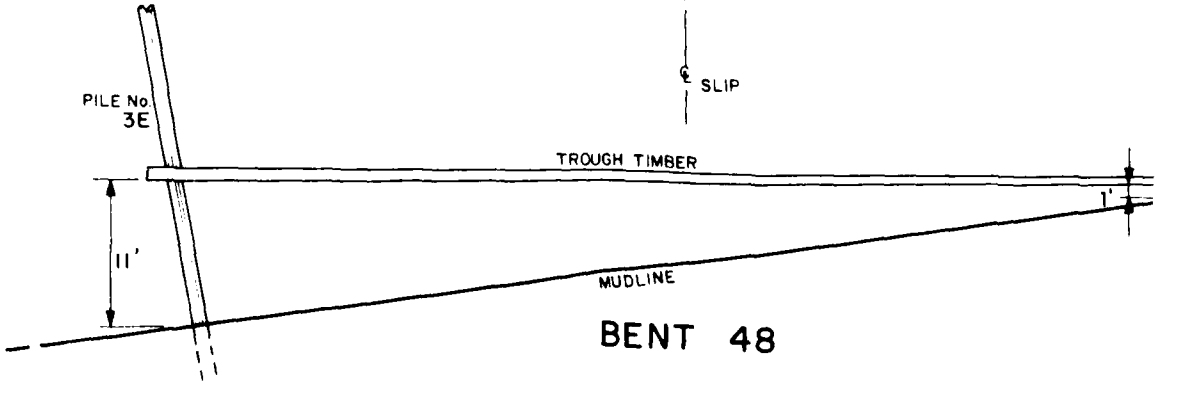
BENT 42



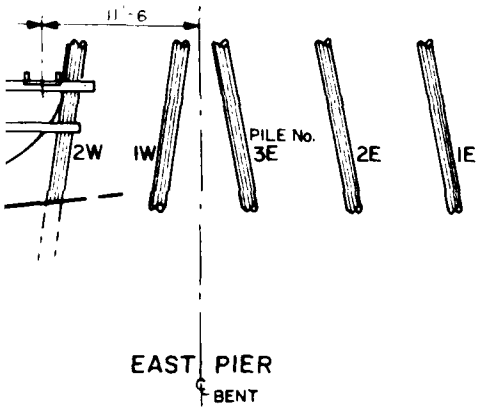
BENT 44

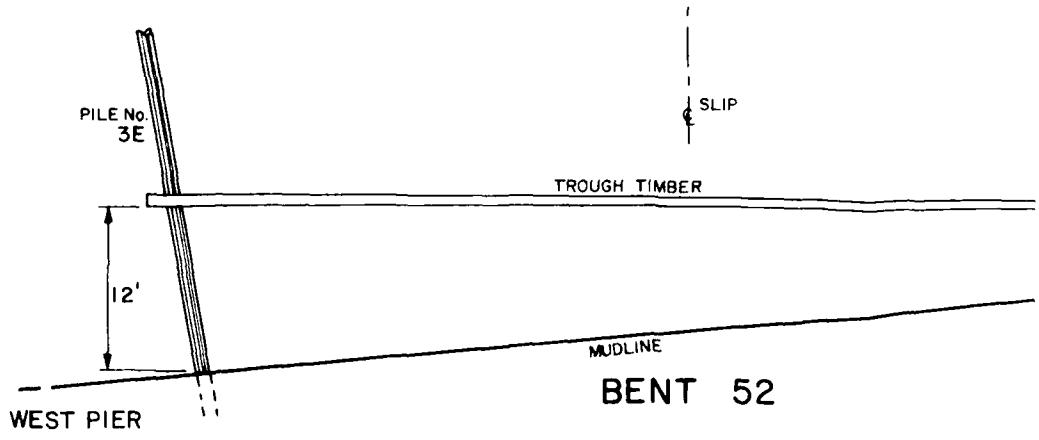


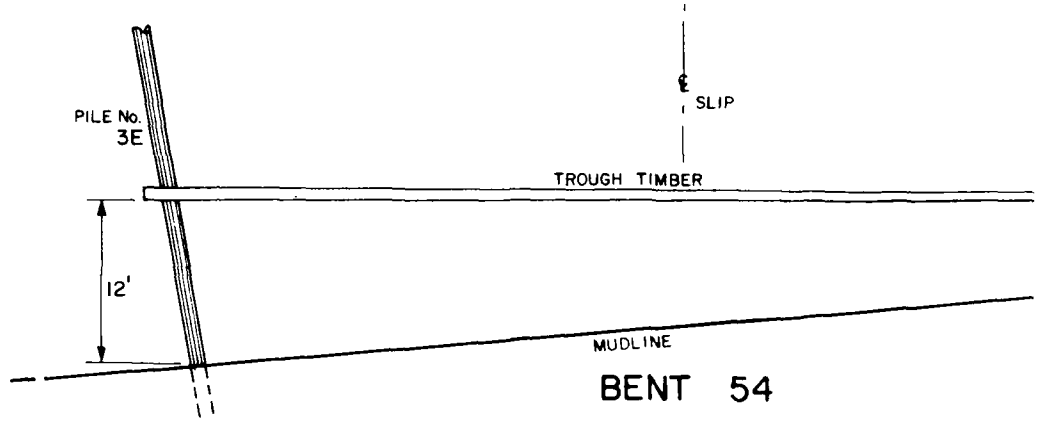
BENT 46

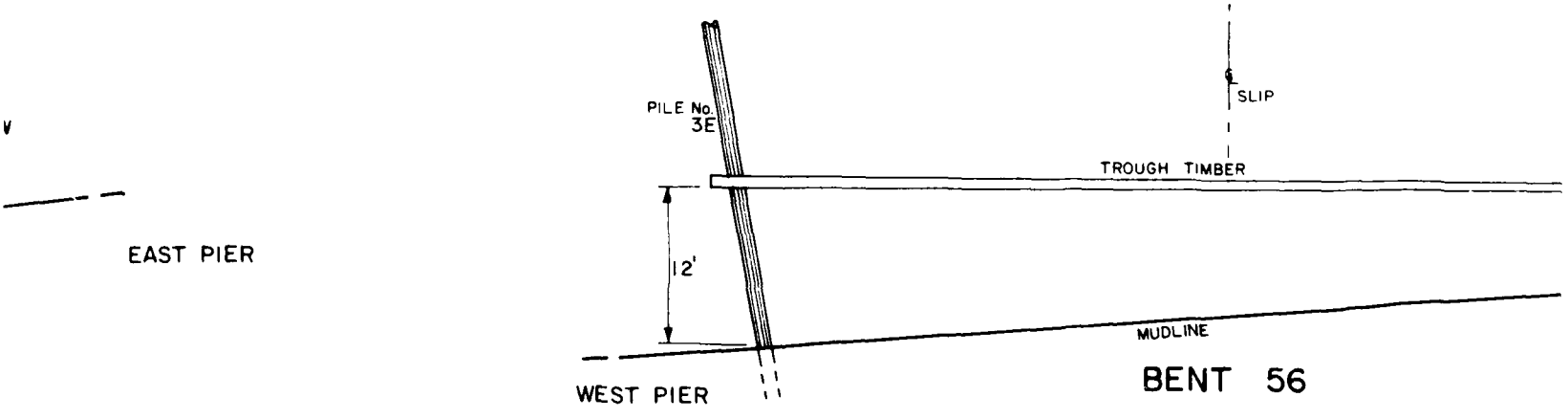


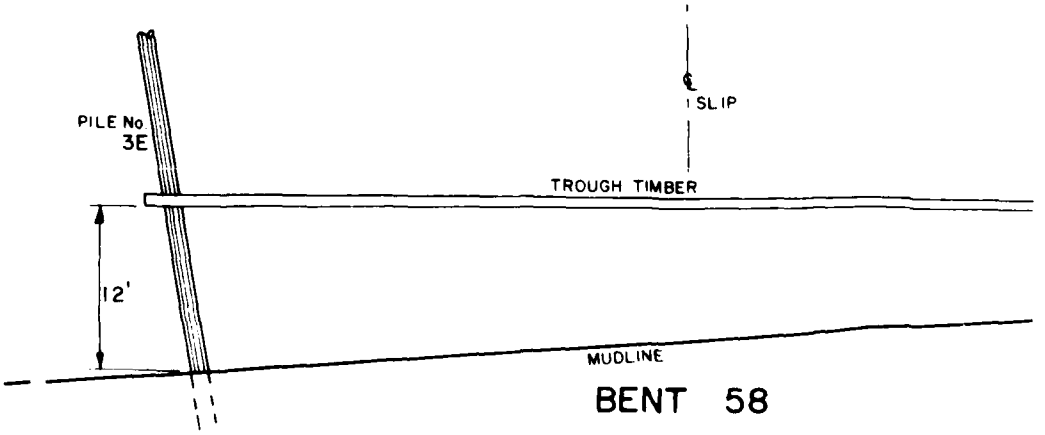
BENT 48


11'-6
2W
1W
PILE No.
3E
2E
1E
EAST PIER
℄ BENT

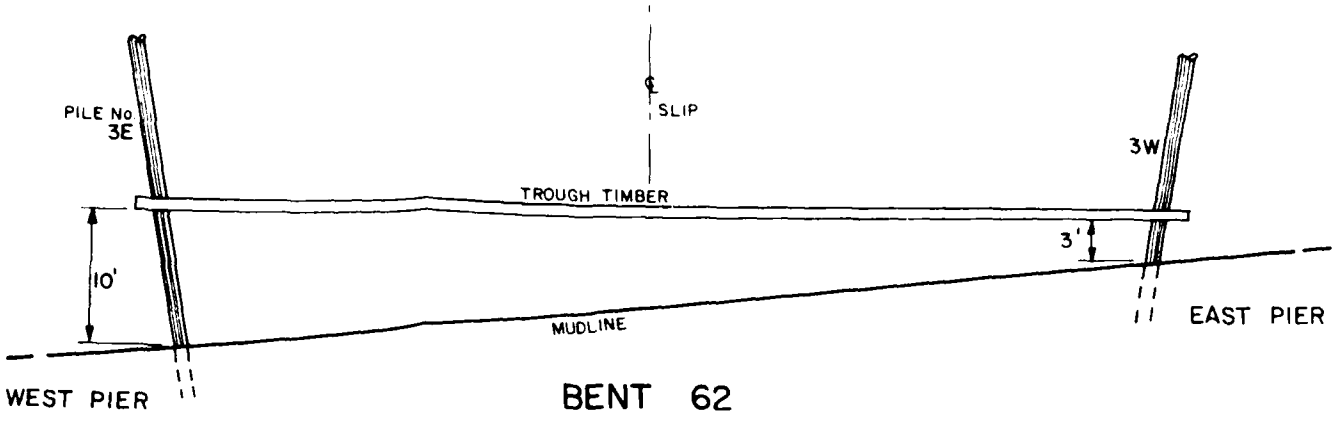

PILE No.
3E
℄ SLIP
TROUGH TIMBER
12'
MUDLINE
WEST PIER
BENT 52


PILE No.
3E
℄ SLIP
TROUGH TIMBER
12'
MUDLINE
BENT 54

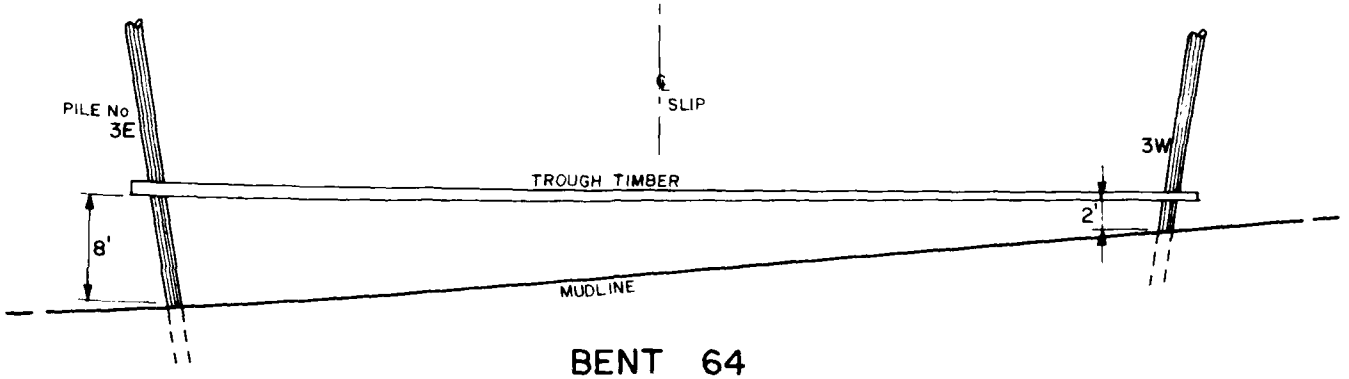

PILE No.
3E
℄ SLIP
TROUGH TIMBER
12'
MUDLINE
WEST PIER
BENT 56
EAST PIER


PILE No
3E
℄ SLIP
TROUGH TIMBER
12'
MUDLINE
BENT 58

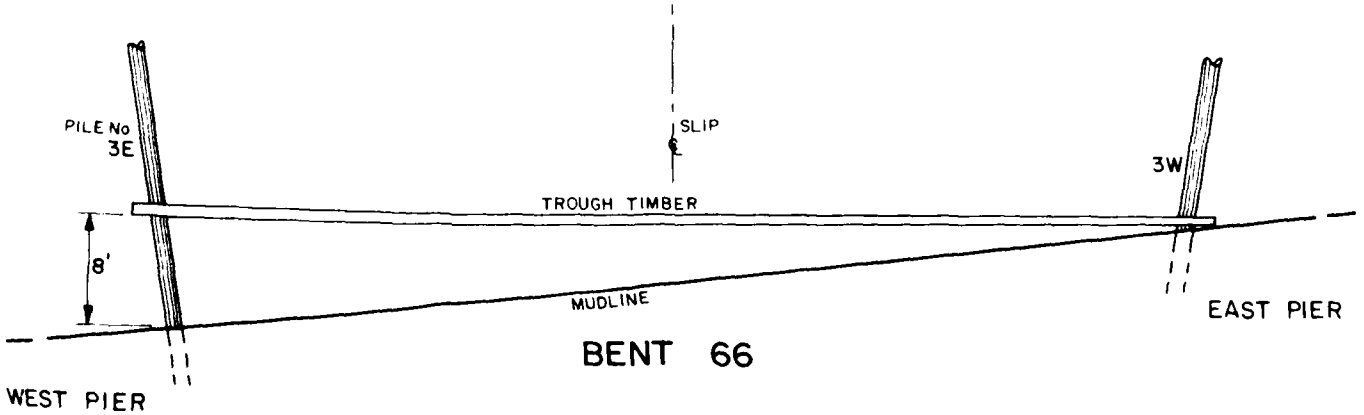
2



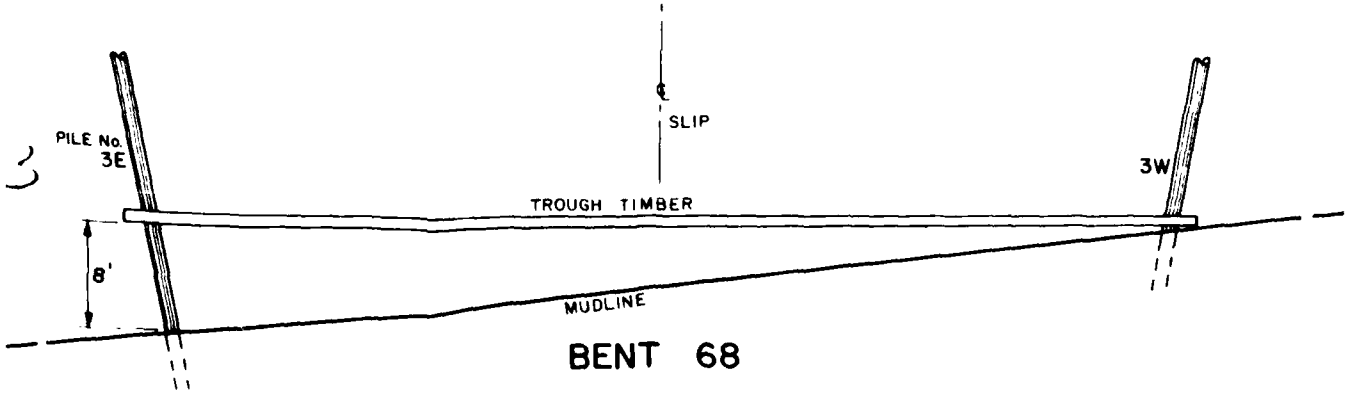
BENT 62



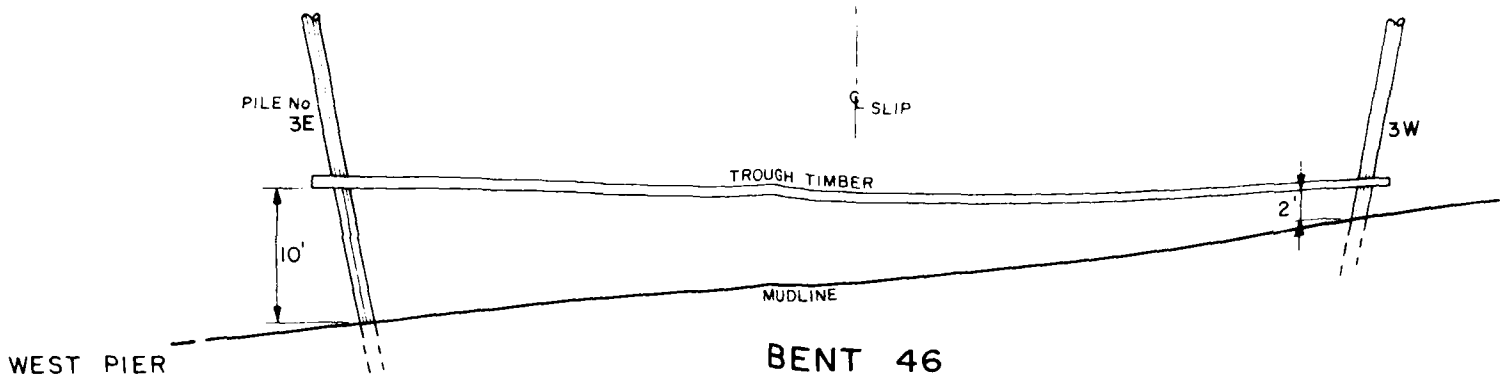
BENT 64



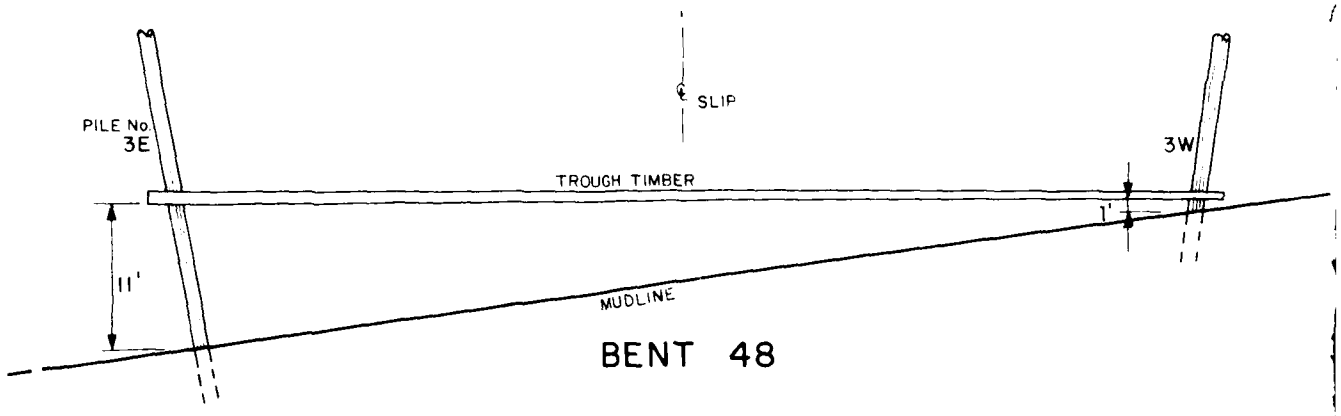
BENT 66



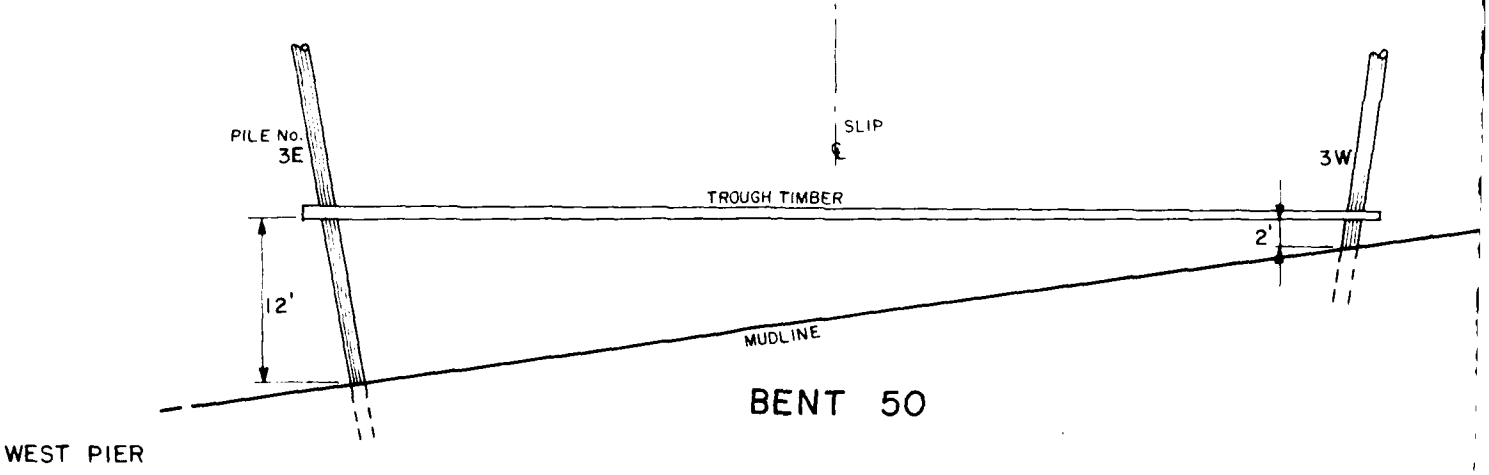
BENT 68



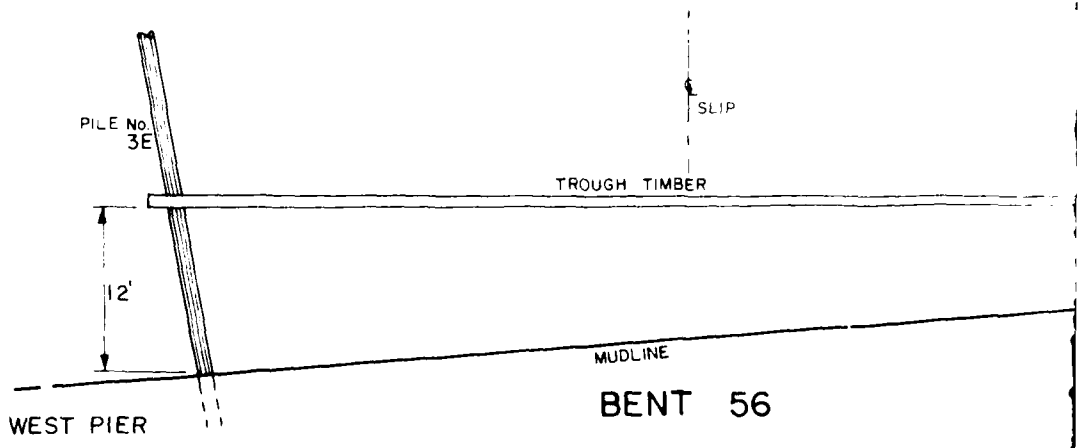
BENT 46



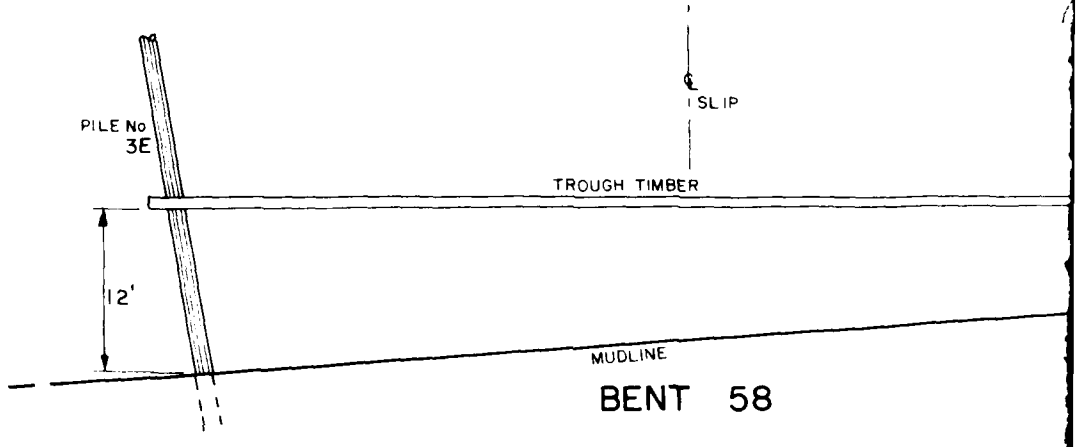
BENT 48



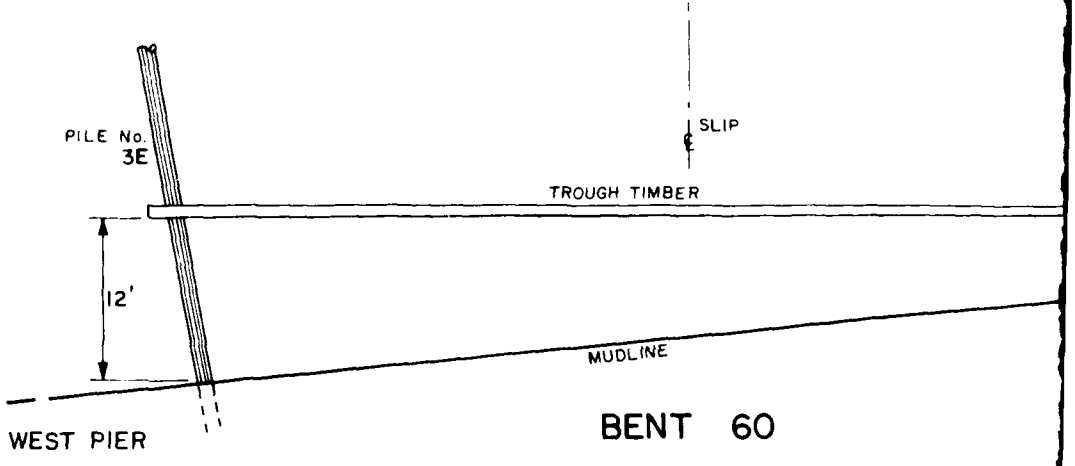
BENT 50



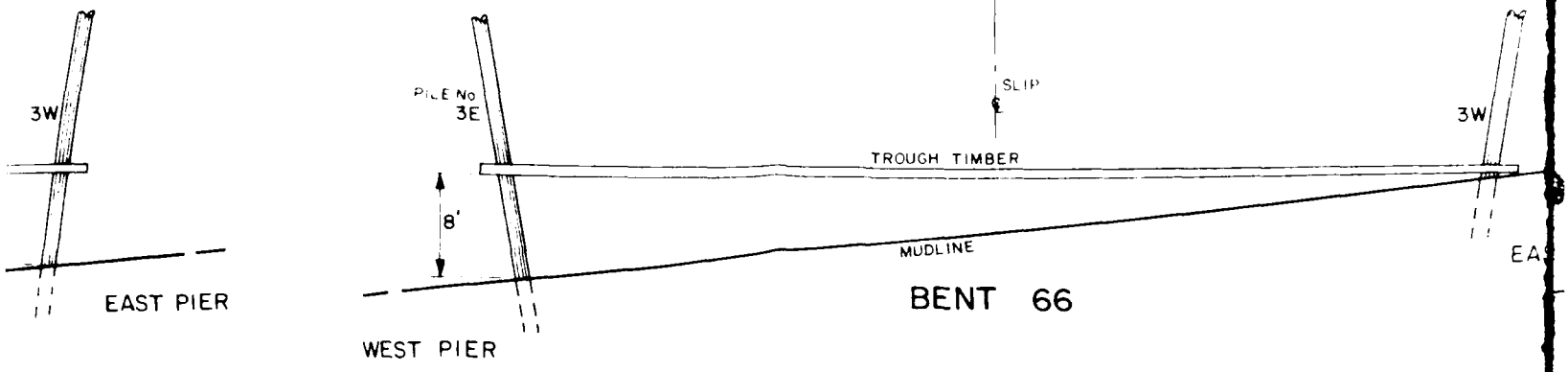
BENT 56



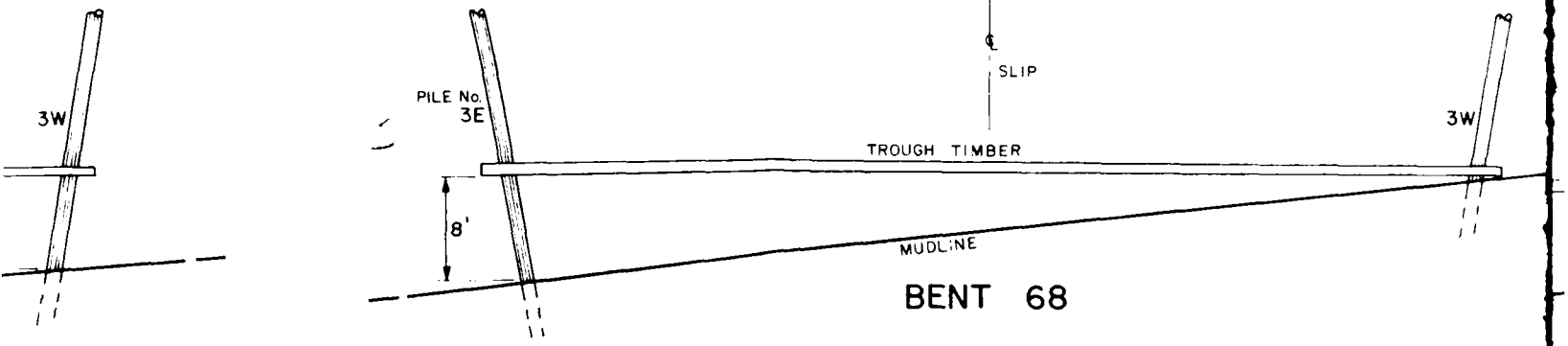
BENT 58



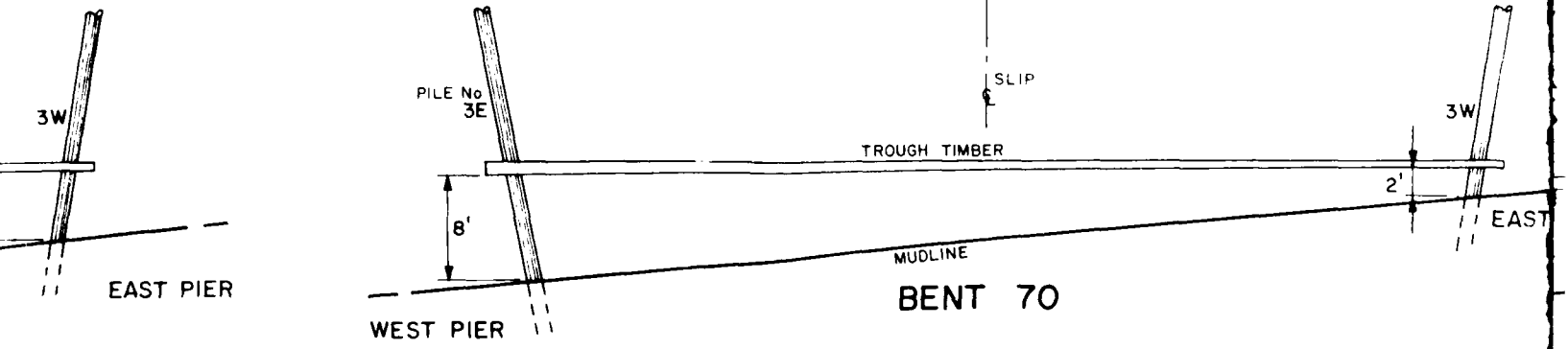
BENT 60



BENT 66



BENT 68



BENT 70

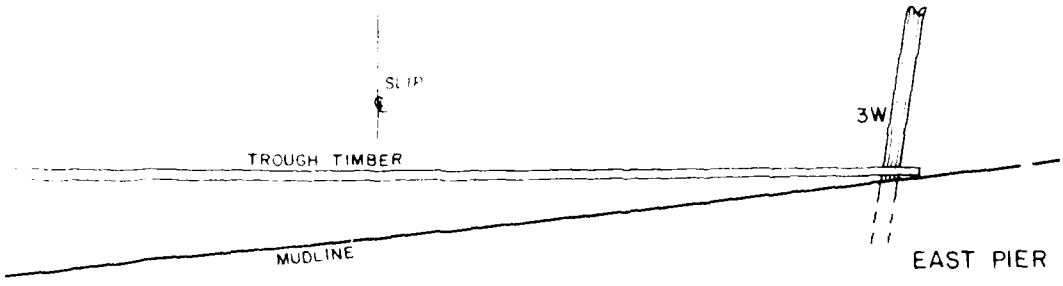
J. AGI & ASSOCIATES
Suite 600, 1414 Alaskan Way, Seattle, WA

PROFILES SHOWING DISTANCE FROM
UNDERSIDE OF X-LOOP SUPPORT POLES TO MUDLINE
DEPERMING PIER
TRIDENT REFIT FACILITY
BANGOR, WASHINGTON

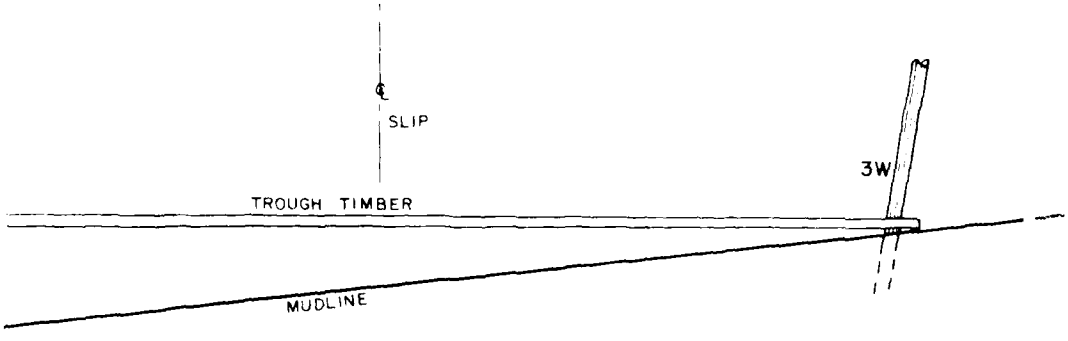
CHESDIV NAV FAC ENG COM
REPORT No. FPO-1-84-(15)
CONTRACT No. N62477-84-D-0024
TASK 1

DWG. No. 3

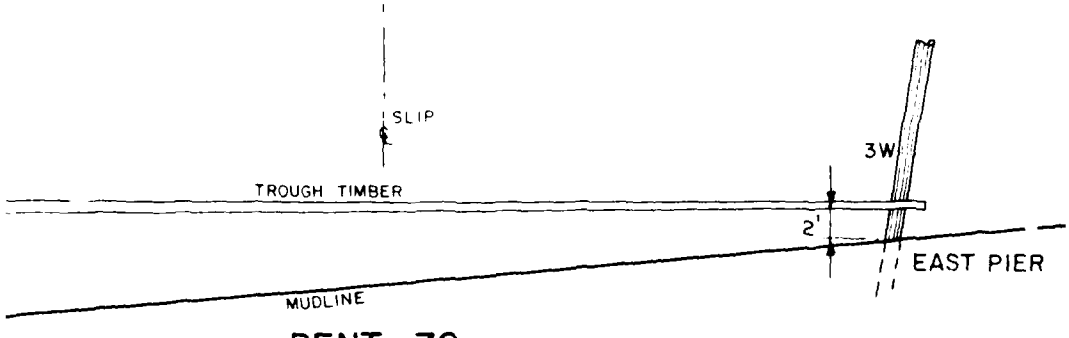
SCALE 3/
DRAWN F R
CHECKED
APPROVED
DATE JUN
PROJECT No.
84-1



BENT 66



BENT 68



BENT 70

J. AGI & ASSOCIATES Suite 600, 1414 Alaskan Way, Seattle, WA	SCALE 3/32" = 1'-0
PROFILES SHOWING DISTANCE FROM UNDERSIDE OF X-LOOP SUPPORT POLES TO MUDLINE DEPERMING PIER TRIDENT REFIT FACILITY BANGOR, WASHINGTON	DRAWN FP CHECKED EBV APPROVED EBV
CHESDIV NAV FAC ENG COM REPORT No. FPO-1-84-(15) CONTRACT No. N62477-84-D-0024 TASK 1 **DWG. No. 3**	DATE JUNE 21, 1984 PROJECT No **84-1-2-153**

4.4 STRUCTURAL CONDITION ASSESSMENT.

The overall condition of the timber piles is excellent. The current results show that 98.5% of the piles included in this inspection are undamaged and retain 100% of the original cross-sectional area. The minor mechanical damage noted in four piles does not detract from the structural integrity of the piles and the piles are still rated at 100%.

Four additional piles have sustained slightly greater damage and these piles are rated at 90% although at this time they may be considered to be at full capacity. Two of these latter piles have also sustained *Bankia* attack through the mechanical breach in the creosoted layer. Potentially this can lead to continued deterioration.

The damage found in the 1980 inspection has been repaired and the piles appear to be performing their function.

The combined results of the 1980 and 1984 inspection provide data on all the piles in the facility. This data provides a base-line for the "as built" condition of the facility which can be used as a reference for all future inspections.

The main poles of the X-loop trough are in good condition but marine-borer damage was found in the framing members at the ends of the timbers and other cable assembly timbers. Total destruction of some of these members was observed with extreme penetration of damage throuth the cut ends of some timbers.

Destruction of the members can render the assembly support system ineffectual and therefore possibly lead to damage to the cables.

The results of the current inspection show that both *Limnoria* and *Bankia* attack are prevalent in this structure from the intertidal zone to the mudline.

4.5 RECOMMENDATIONS

Piles 29-2W, (Access Trestle) and 60-1W, (West Pier), have sustained mechanical damage and marine borer attack. The localized areas of damage should be encased in plastic wrap in order to halt the current attack, prevent furture attack and maintain piles at their present condition. The cost of this maintenance should be in the order of $5,000.00 (See Executive Summary Table).

Maintenance cost of $2500.00 per pile is based on quoted cost of plastic wrap of approximately $50.00 per lineal foot installed. Hence cost of wrapping 50 feet of pile would be in the order of $2500.00 per pile.

The level of damage observed in the cable assembly support timbers warrants a comprehensive inspection of these members.

In addition to the above inspection, it is also recommended that periodic inspections at three to six year intervals be carried out. This is particularly significant in this structure since widespread *Limnoria* and *Bankia* damage was found throughout. Regular inspections will serve to identify any deficient areas and thereby assure the structural integrity of the facility. All subsequent inspections should use this report as a datum or base line.

LEGEND TO TABLES

Appx.	=	Approximately
B.	=	*Bankia setacea*
BR	=	Battered pile
E	=	East
ITZ	=	Intertidal zone
L.	=	*Limnoria*
MBC	=	Marine-borer cavity
MB	=	Marine-borer
MDL	=	Mudline
Mech.	=	Mechanical
m.l.w.	=	Mean low water
N	=	North
S	=	South
W	=	West

TABLE 1

REMAINING CROSS-SECTIONAL AREA AND DESCRIPTION OF DAMAGE TO INDIVIDUAL PILING

MAGNETIC SILENCING FACILITY, BANGOR, WASHINGTON

Pile ID Bent Pile	Area Rating	Remarks	Pile ID Bent Pile	Area Rating	Remarks
ACCESS TRESTLE			17 - 3N	100	
			3S	100	
5 - 1	100				
2E	100		18 - 1	100	
2W	100		2E	100	
3	100		2W	100	
6 - 1	100		3	100	
2E	100		21 - 1	100	
2W	100		2E	100	
3	100		2W	100	
9 - 1	90	5% Mech. abrasion & shaking.	3	100	
2E	100		22 - 1N	100	
2W	100		1S	100	
3	100		2E	100	
10 - 1	100		2W	100	
2E	100		3N	100	
2W	100		3S	100	
3	100		25 - 1	100	
13 - 1	100		2E	100	
2E	100		2W	100	
2W	100		3	100	
3	100		26 - 1	100	
14 - 1	100		2E	100	
2E	100		2W	100	
2W	100		3	100	
3	100		29 - 1	100	
17 - 1N	100		2E	100	
1S	100		2W	90	1% Mech. & B.damage at -30 feet.
2E	100		3	100	
2W	100				

TABLE 1

REMAINING CROSS-SECTIONAL AREA AND DESCRIPTION OF DAMAGE TO INDIVIDUAL PILING

MAGNETIC SILENCING FACILITY, BANGOR, WASHINGTON

Pile ID Bent Pile	Area Rating	Remarks	Pile ID Bent Pile	Area Rating	Remarks
HEADER PIER			44 - 1W	100	
31 - 1	100		1E	100	
2N	100		2W	100	
2S	100		2E	100	
3	100		3W	100	
32 - 1	100		3E	100	
2N	100		45 - 1W	100	
2S	100		1E	100	
3	100		2W	100	
36 - 1	100		2E	100	
2N	100		3W	100	
2S	100		3E	100	
3	100		48 - 1W	100	
36.5 - 1	100		1E	100	
2N	100		2W	100	
2S	100		2E	100	
3	100		3W	100	
WEST PIER			3E	100	
39 - 1	100		49 - 1W	100	
2W	100		1E	100	
2E	100		2W	100	
3	100		2E	100	
41 - 1W	100		3W	100	
1E	100		3E	100	
2W	100		(51 - 2E)	Repaired	Stainless steel sleeve from MDL up 10' appx. 1/8" thick. Good condition.
2E	100				
3W	100				
3E	100				

TABLE 1

REMAINING CROSS-SECTIONAL AREA AND DESCRIPTION OF DAMAGE TO INDIVIDUAL PILING

MAGNETIC SILENCING FACILITY, BANGOR, WASHINGTON

Pile ID Bent Pile	Area Rating	Remarks	Pile ID Bent Pile	Area Rating	Remarks
52 - 1W	100		60 - 1E	100	
1E	100		2W	100	
2W	100		2E	100	
2E	100		3W	100	
3W	100		3E	90	5% shake 1" deep at -15', no B.
3E	100				
53 - 1W	100		61 - 1W	100	
1E	100		1E	100	
2W	100		2W	100	
2E	100		2E	100	
3W	100		3W	100	
3E	100		3E	100	
54 - 1W	100		64 - 1W	100	
3E	100		1E	100	
			2W	100	
56 - 1W	100		2E	100	
1E	100		3W	100	
2W	100	1% shake -5',no MB	3E	100	
2E	100	5% shake -20',no MB			
3W	100		65 - 1W	100	
3E	100		1E	100	
			2W	100	
57 - 1W	100		2E	100	
1E	100		3W	100	
2W	100		3E	100	
2E	100				
3W	100	1% shake appx. -15'	68 - 1N	100	
3E	100		1S	100	1% shake off pile at 7' above MDL.
60 - 1W	90	2% Mech.shake B. tunnels @ -10'	1	100	
			2W	100	

TABLE 1

REMAINING CROSS-SECTIONAL AREA AND DESCRIPTION OF DAMAGE TO INDIVIDUAL PILING

MAGNETIC SILENCING FACILITY, BANGOR, WASHINGTON

Pile ID Bent Pile	Area Rating	Remarks	Pile ID Bent Pile	Area Rating	Remarks
68 - 2E	100		45 - 1	100	
3	100		2E	100	
3N	100		2W	100	
3S	100		3	100	
69 - 1N	100		48 - 1	100	
1S	100		2E	100	
1	100		2W	100	
2W	100		3	100	
2E	100		49 - 1	100	
3	100		2E	100	
3N	100		2W	100	
3S	100		3	100	
(77 - 3S)	Repaired	10-12' sleeve 0' down, good.	52 - 1	100	
			2E	100	
(3N)	Repaired	15' sleeve mid tide down.	2W	100	
			3	100	
EAST PIER					
			53 - 1	100	
40 - 1	100		2E	100	
2E	100		2W	100	
2W	100		3	100	
3	100				
			56 - 1	100	
41 - 1	100		2E	100	
2E	100		2W	100	
2W	100		3	100	
3	100				
			57 - 1E	100	
44 - 1	100		1W	100	
2E	100		2E	100	
2W	100		2W	100	
3	100				

TABLE 1

REMAINING CROSS-SECTIONAL AREA AND DESCRIPTION OF DAMAGE TO INDIVIDUAL PILING

MAGNETIC SILENCING FACILITY, BANGOR, WASHINGTON

Pile ID Bent Pile	Area Rating	Remarks	Pile ID Bent Pile	Area Rating	Remarks
57 - 3E	100		68 - 2E	100	
3W	100		2W	100	
60 - 1E	100		3	100	
1W	100		3N	100	
2E	100		3S	100	
3E	100		69 - 1W	100	
3W	100		1E	100	
61 - 1E	100		2W	100	
1W	100		2E	100	
2E	100		2.8	100	
2W	100		2.9N	100	
3E	100		2.9S	100	
3W	100		3N	100	
64 - 1E	100		3S	100	
1W	100				
2E	100				
2W	100				
3E	100				
3W	100				
65 - 1E	100				
1W	100				
2E	100				
2W	100				
3E	100				
3W	100				
68 - 1	100				
1N	100				
1S	100				

TABLE 2

NUMERICAL AND PERCENTAGE DISTRIBUTION OF DAMAGE

MAGNETIC SILENCING FACILITY, BANGOR, WASHINGTON

PERCENT REMAINING CROSS-SECTIONAL AREA	NUMBER AND PERCENTAGE OF PILES IN EACH AREA CLASSIFICATION	
	NUMBER	PERCENT
100	250	98.5%
90	4	1.5%
75	0	0
50	0	0
25	0	0
0	0	0
TOTALS:	254	100%

TABLE 3

COLUMN LOAD CAPACITY CALCULATIONS

1984 INSPECTION

Pile load capacities were calculated by an inhouse computer program using the Southern Pine Association modified Euler equation for long columns where,

$$P_{ult} = \frac{0.30\ E}{(L/d)^2} \times A$$

Pile lengths (L) were taken from mudline to cap. The unsupported length of pile (USL) was taken from below the bracing at the top and ten feet was added at the mudline to allow for the point of fixity. Effective length factor (K) of 0.8 was used. Other program parameters used are described below:

Bent - bent identification

PIle - pile (row) identification

ITP - type of wood (1=fir)

Length - unsupported length - in this project, 10 feet was added onto the USL since the point of fixity at the bottom was considered to be 10 feet below the mudline.

EFF-L Factor - effective length factor, K. K=0.8 was used for these calculations

ORG-DIA - original pile diameter - taken at mudline

EFF-ARA - remaining cross-sectional area based on sonic testing, on the following basis:

Factor	Cross-Sectional area remaining
1.00	100%
0.90	90%-100%
0.75	75%-100%
0.50	50%- 75%
0.25	25%- 50%
0.005*	0%- 25%

(*the program cannot handle 0.000)

EFF-DIA - effective pile diameter

EFF-ARA - effective cross-sectional area of pile

C	-	compression parallel to grain, in psi, for fir
L/D	-	length over diameter ratio
P-ULT, LB	-	ultimate loading capacity of the pile column in pounds. This refers only to the column length as shown and does not take into account soil conditions (other than to establish the point of fixity), and what the pile was originally driven to in terms of design loads.

It is strongly emphazied that these calculations deal only with the ultimate capacity of the wood pile column within the fixity conditions and USL parameters as perceived. These load calculations are not design load calculations.

(Structural analysis in light of lateral loading was not included since this is considerably beyond the scope of this project. Such an analysis would require details on imposed lateral loading and structural analysis of the entire facility in terms of these loads and existing structural parameters.)

TABLE 3

COMPUTER PRINT OUT

1984

MSF PILE LOADING CAPACITIES (P ULTIMATE)
NAVAL SUBMARINE BASE, BANGOR, WA AUGUST 1984

-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/DS	P-ULT LB
APPROACHWAY TRESTLE											
5	1	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	2E	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	2W	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	3	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
6	1	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	2E	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	2W	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	3	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
9	1	1	39.00	0.800	1.000	0.900	0.949	101.79	349.	37	35476.
	2E	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	2W	1	39 00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	3	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
10	1	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	2E	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	2W	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
	3	1	39.00	0.800	1.000	1.000	1.000	113.10	387.	35	43797.
13	1	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
	2E	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
	2W	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
	3	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
14	1	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
	2E	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
	2W	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
	3	1	38.00	0.800	1.000	1.000	1.000	113.10	408.	34	46133.
17	1N	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
	1S	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
	2E	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
	2W	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
	3N	1	45.00	0 800	1.270	1.000	1.270	182.41	469.	32	85579.
	3S	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
18	1	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
	2E	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
	2W	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579
	3	1	45.00	0.800	1.270	1.000	1.270	182.41	469.	32	85579.
21	1	1	48.00	0.800	1.270	1.000	1.270	182.41	412.	34	75216.
	2E	1	48.00	0.800	1.270	1.000	1.270	182.41	412.	34	75216.
	2W	1	48.00	0.800	1.270	1.000	1.270	182.41	412.	34	75216.
	3	1	48.00	0.800	1.270	1.000	1.270	182.41	412.	34	75216.
22	1N	1	50.00	0.800	1.270	1.000	1.270	182.41	380.	36	69319.
	1S	1	50.00	0.800	1.270	1.000	1.270	182.41	380.	36	69319.

MSF PILE LOADING CAPACITIES (P ULTIMATE)
NAVAL SUBMARINE BASE, BANGOR, WA AUGUST 1984
-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/DS	P-ULT LB
	2E	1	50.00	0.800	1.270	1.000	1.270	182.41	380.	36	69319.
	2W	1	50.00	0.800	1.270	1.000	1.270	182.41	380.	36	69319.
	3N	1	50.00	0.800	1.270	1.000	1.270	182.41	380.	36	69319.
	3S	1	50.00	0.800	1.270	1.000	1.270	182.41	380.	36	69319.
25	1	1	53.00	0.800	1.330	1.000	1.330	200.06	371.	36	74205.
	2E	1	53.00	0.800	1.330	1.000	1.330	200.06	371.	36	74205.
	2W	1	53.00	0.800	1.330	1.000	1.330	200.06	371.	36	74205.
	3	1	53.00	0.800	1.330	1.000	1.330	200.06	371.	36	74205.
26	1	1	54.00	0.800	1.330	1.000	1.330	200.06	357.	37	71482.
	2E	1	54.00	0.800	1.330	1.000	1.330	200.06	357.	37	71482.
	2W	1	54.00	0.800	1.330	1.000	1.330	200.06	357.	37	71482.
	3	1	54.00	0.800	1.330	1.000	1.330	200.06	357.	37	71482.
29	1	1	58.00	0.800	1.330	1.000	1.330	200.06	310.	39	61962.
	2E	1	58.00	0.800	1.330	1.000	1.330	200.06	310.	39	61962.
	2W	1	58.00	0.800	1.330	1.000	1.330	200.06	310.	39	61962.
	3	1	58.00	0.800	1.330	1.000	1.330	200.06	310.	39	61962.
HEADER PIER											
31	1	1	60.00	0.800	1.420	1.000	1.420	228.05	330.	38	75236.
	2N	1	60.00	0.800	1.420	1.000	1.420	228.05	330.	38	75236.
	2S	1	60.00	0.800	1.420	1.000	1.420	228.05	330.	38	75236.
	3	1	60.00	0.800	1.420	1.000	1.420	228.05	330.	38	75236.
32	1	1	63.00	0.800	1.420	1.000	1.420	228.05	299.	40	68242.
	2N	1	63.00	0.800	1.420	1.000	1.420	228.05	299.	40	68242.
	2S	1	63.00	0.800	1.420	1.000	1.420	228.05	299.	40	68242.
	3	1	63.00	0.800	1.420	1.000	1.420	228.05	299.	40	68242.
36	1	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	2N	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	2S	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	3	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
36.5	1	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	2N	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	2S	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	3	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
WEST PIER											
39W	1	1	72.00	0.800	1.420	1.000	1.420	228.05	229.	46	52247.
	2W	1	72.00	0.800	1.420	1.000	1.420	228.05	229.	46	52247.
	2E	1	72.00	0.800	1.420	1.000	1.420	228.05	229.	46	52247.
	3	1	72.00	0.800	1.420	1.000	1.420	228.05	229.	46	52247.
41W	1W	1	72.00	0.800	1.440	1.000	1.440	234.52	236.	45	55254.

MSF PILE LOADING CAPACITIES (P ULTIMATE)
NAVAL SUBMARINE BASE, BANGOR, WA AUGUST 1984

-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/DS	P-ULT LB
	1E	1	72.00	0.800	1.440	1.000	1.440	234.52	236.	45	55254.
	2W	1	72.00	0.800	1.440	1.000	1.440	234.52	236.	45	55254.
	2E	1	72.00	0.800	1.440	1.000	1.440	234.52	236.	45	55254.
	3W	1	72.00	0.800	1.440	1.000	1.440	234.52	236.	45	55254.
	3E	1	72.00	0.800	1.440	1.000	1.440	234.52	236.	45	55254.
44W	1W	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	1E	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	2W	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	2E	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	3W	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	3E	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
45W	1W	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	1E	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	2W	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	2E	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	3W	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
	3E	1	74.00	0.800	1.440	1.000	1.440	234.52	223.	46	52307.
48W	1W	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	1E	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	2W	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	2E	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	3W	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	3E	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
49W	1W	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	1E	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	2W	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163
	2E	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	3W	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
	3E	1	77.00	0.800	1.400	1.000	1.400	221.67	195.	50	43163.
52W	1W	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	1E	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	2W	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	2E	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	3W	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	3E	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
53W	1W	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	1E	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	2W	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	2E	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	3W	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
	3E	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
54W	1W	1	80.00	0.800	1.450	1.000	1.450	237.79	193.	50	46012.
	3E	1	77.00	0.800	1.450	1.000	1.450	237.79	209.	48	49667.
56W	1W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.

MSF PILE LOADING CAPACITIES (P ULTIMATE)
NAVAL SUBMARINE BASE, BANGOR, WA AUGUST 1984

-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/DS	P-ULT LB
	1E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
57W	1W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	1E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
60W	1W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	1E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
61W	1W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	1E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	2E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3W	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
	3E	1	78.00	0.800	1.450	1.000	1.450	237.79	204.	49	48402.
64W	1W	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	1E	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	2W	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	2E	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	3W	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	3E	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
65W	1W	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	1E	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	2W	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	2E	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351.
	3W	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351
	3E	1	75.00	0.800	1.450	1.000	1.450	237.79	220.	47	52351
68W	1N	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	1S	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	1	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	2W	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805
	2E	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	3	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	3N	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	3S	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
69	1N	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	1S	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.

MSF PILE LOADING CAPACITIES (P ULTIMATE)
NAVAL SUBMARINE BASE, BANGOR, WA AUGUST 1984
-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/DS	P-ULT LB
	1	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	2W	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	2E	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	3	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	3N	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
	3S	1	72.00	0.800	1.450	1.000	1.450	237.79	239.	45	56805.
EAST PIER											
40E	1	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	3	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
41E	1	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	3	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
44E	1	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	3	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
45E	1	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
	3	1	63.00	0.800	1.330	1.000	1.330	200.06	263.	43	52517.
48E	1	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
	2E	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
	2W	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
	3	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
49E	1	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
	2E	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
	2W	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
	3	1	64.00	0.800	1.420	1.000	1.420	228.05	290.	41	66126.
52E	1	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
	2E	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
	2W	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
	3	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
53E	1	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
	2E	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
	2W	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
	3	1	65.00	0.800	1.420	1.000	1.420	228.05	281.	41	64107.
56E	1	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	2E	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.

MSF PILE LOADING CAPACITIES (P ULTIMATE)
NAVAL SUBMARINE BASE, BANGOR, WA AUGUST 1984

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/DS	P-ULT LB
	2W	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	3	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
57E	1E	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	1W	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	2E	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	2W	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	3E	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
	3W	1	66.00	0.800	1.420	1.000	1.420	228.05	273.	42	62179.
60E	1E	1	67.00	0.800	1.450	1.000	1.450	237.79	276.	42	65599.
	1W	1	67.00	0.800	1.450	1.000	1.450	237.79	276.	42	65599.
	2E	1	67.00	0.800	1.450	1.000	1.450	237.79	276.	42	65599.
	2W	1	67.00	0.800	1.450	1.000	1.450	237.79	276.	42	65599.
	3E	1	67.00	0.800	1.450	1.000	1.450	237.79	276.	42	65599.
	3W	1	67.00	0.800	1.450	1.000	1.450	237.79	276.	42	65599.
61E	1E	1	65.00	0.800	1.450	1.000	1.450	237.79	293.	40	69698.
	1W	1	65.00	0.800	1.450	1.000	1.450	237.79	293.	40	69698.
	2E	1	65.00	0.800	1.450	1.000	1.450	237.79	293.	40	69698.
	2W	1	65.00	0.800	1.450	1.000	1.450	237.79	293.	40	69698.
	3E	1	65.00	0.800	1.450	1.000	1.450	237.79	293.	40	69698.
	3W	1	65.00	0.800	1.450	1.000	1.450	237.79	293.	40	69698.
64E	1E	1	63.00	0.800	1.450	1.000	1.450	237.79	312.	39	74194.
	1W	1	63.00	0.800	1.450	1.000	1.450	237.79	312.	39	74194.
	2E	1	63.00	0.800	1.450	1.000	1.450	237.79	312.	39	74194.
	2W	1	63.00	0.800	1.450	1.000	1.450	237.79	312.	39	74194.
	3E	1	63.00	0.800	1.450	1.000	1.450	237.79	312.	39	74194.
	3W	1	63.00	0.800	1.450	1.000	1.450	237.79	312.	39	74194.
65E	1E	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	1W	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	2E	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	2W	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	3E	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	3W	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
68E	1	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	1S	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	2E	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	2W	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	3	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	3N	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	3S	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
69E	1W	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	1E	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	2W	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	2E	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	29N	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	29S	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.

MSF PILE LOADING CAPACITIES (P ULTIMATE)
NAVAL SUBMARINE BASE, BANGOR, WA AUGUST 1984

-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/DS	P-ULT LB
	3N	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.
	3S	1	61.00	0.800	1.450	1.000	1.450	237.79	333.	38	79139.

End of file on DAT02 causes a return to MTS.
Execution terminated 13:15:26 T=0.502 RC=0 $1.20

$SIG

TABLE 4

COLUMN LOAD CAPACITY CALCULATIONS

1980 INSPECTION

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1988
-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA INZ	C PSI	L/D	P-ULT LB
APPROACHWAY PILING											
1	1	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	2E	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	2W	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	3	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
2	1N	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	1S	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	2E	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	2W	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	3N	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
	3S	1	34.00	0.800	0.920	1.000	0.920	95.73	549.	37	52566.
3	1	1	36.00	0.800	0.920	1.000	0.920	95.73	498.	31	46838.
	2E	1	36.00	0.800	0.920	1.000	0.920	95.73	498.	31	46838.
	2W	1	36.00	0.800	0.920	1.000	0.920	95.73	498.	31	46838.
	3	1	36.00	0.800	0.920	1.000	0.920	95.73	498.	31	46838.
4	1	1	37.00	0.800	0.920	1.000	0.920	95.73	464.	32	44388.
	2E	1	37.00	0.800	0.920	1.000	0.920	95.73	464.	32	44388.
	2W	1	37.00	0.800	0.920	1.000	0.920	95.73	464.	32	44388.
	3	1	37.00	0.800	0.920	1.000	0.830	77.91	377.	36	29485.
7	1N	1	39.00	0.800	0.920	1.000	0.920	95.73	417.	34	39950.
	1S	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	2E	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	2W	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	3N	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	3S	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	1	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	2E	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	2W	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	3	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
11	1	1	39.00	0.800	1.090	1.000	1.090	131.92	575.	29	75372.
	2E	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	2W	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	3	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	1N	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	1S	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	2E	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	2W	1	39.00	0.800	1.090	1.000	1.090	113.10	493.	31	55768.
	3N	1	39.00	0.800	1.090	1.000	1.090	131.92	575.	29	75372.
	3S	1	39.00	0.800	1.090	1.000	1.090	131.92	575.	29	75372.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1980
-1

BENT	PILE	TYP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA INZ	C PSI	L/D	P-ULT LB
15	1	1	37.00	0.800	1.000	1.600	1.000	113.10	548.	30	61960.
	2E	1	37.00	0.800	1.000	1.000	1.000	113.10	548.	30	61960.
	2W	1	37.00	0.800	1.000	1.000	1.000	113.10	548.	30	61960.
	3	1	37.00	0.800	1.000	1.000	1.000	131.92	639.	27	84296.
	1	1	36.00	0.800	1.000	1.000	1.000	131.92	675.	27	89044.
	2E	1	36.00	0.800	1.000	1.000	1.000	113.10	579.	29	65450.
	2W	1	36.00	0.800	1.000	1.000	1.000	131.92	675.	27	89044.
	3	1	36.00	0.800	1.000	1.000	1.000	113.10	579.	29	65450.
19	1	1	45.00	0.800	1.420	1.000	1.420	228.05	705.	25	160775.
	2E	1	45.00	0.800	1.330	1.000	1.330	200.06	655.	27	131068.
	2W	1	45.00	0.800	1.000	1.000	1.000	131.92	432.	33	56988.
	3	1	45.00	0.800	1.250	1.000	1.250	176.71	579.	29	102265.
8	1	1	46.00	0.800	1.330	1.000	1.330	200.06	627.	28	125431.
	2E	1	46.00	0.800	1.250	1.000	1.250	176.71	554.	29	97867.
	2W	1	46.00	0.800	1.250	1.000	1.250	176.71	554.	29	97867.
	3	1	46.00	0.800	1.250	1.000	1.250	176.71	554.	29	97867.
23	1	1	52.00	0.800	1.250	1.000	1.250	176.71	439.	33	76586.
	2E	1	52.00	0.800	1.330	1.000	1.330	200.06	491.	31	98155.
	2W	1	52.00	0.800	1.330	1.000	1.330	200.06	491.	31	98155.
	3	1	52.00	0.800	1.330	1.000	1.330	200.06	491.	31	98155.
4	1	1	53.00	0.800	1.330	1.000	1.330	200.06	472.	32	94486.
	2E	1	53.00	0.800	1.500	1.000	1.500	254.47	681.	28	152872.
	2W	1	53.00	0.800	1.330	1.000	1.330	200.06	472.	32	94486.
	3	1	53.00	0.800	1.330	1.000	1.330	200.06	472.	32	94486.
27	1	1	56.00	0.800	1.330	1.000	1.330	200.06	423.	34	84634.
	1S	1	56.00	0.800	1.500	1.000	1.500	254.47	608.	30	136931.
	2E	1	56.00	0.800	1.500	1.000	1.500	254.47	608.	30	136931.
	2W	1	56.00	0.800	1.500	1.000	1.500	254.47	608.	30	136931.
	3W	1	56.00	0.800	1.500	1.000	1.500	254.47	608.	30	136931.
	3S	1	56.00	0.800	1.500	1.000	1.500	254.47	608.	30	136931.
9	1	1	58.00	0.800	1.330	1.000	1.330	200.06	394.	35	78898.
	2W	1	58.00	0.800	1.330	1.000	1.330	200.06	394.	35	78898.
	2S	1	58.00	0.800	1.330	1.000	1.330	200.06	394.	35	78898.
	3	1	56.00	0.800	1.500	1.000	1.500	254.47	592.	31	127651.
HEADER PIER											
30	1	1	59.00	0.800	1.420	1.000	1.420	228.05	434.	33	99075.
	2W	1	57.00	0.800	1.420	1.000	1.420	228.05	434.	33	99075.
	2S	1	57.00	0.800	1.420	1.000	1.420	228.05	434.	33	99075.
	3	1	59.00	0.800	1.420	1.000	1.420	228.05	434.	33	99075.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1980
-1

PIER	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/D	P-ULT LB
	1E	1	66.00	0.800	1.500	1.000	1.500	254.47	387.	35	98580.
	1W	1	66.00	0.800	1.500	1.000	1.500	254.47	387.	35	98580.
	2W	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	2S	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	2E	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	3W	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
4	1	1	66.00	0.800	1.250	1.000	1.250	176.71	269.	42	47541.
	1N	1	66.00	0.800	1.500	1.000	1.500	254.47	387.	35	98580.
	2S	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
	3	1	66.00	0.800	1.250	1.000	1.250	176.71	269.	42	47541.
5	1E	1	66.00	0.800	1.250	1.000	1.250	176.71	269.	42	47541.
	1W	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	2N	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
	2S	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
	3E	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
	3W	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
1 ST PIER											
37W	1	1	72.00	0.800	1.420	1.000	1.420	228.05	292.	41	66528.
	2W	1	72.00	0.800	1.500	1.000	1.500	282.34	361.	36	101971.
	2E	1	72.00	0.800	1.420	1.000	1.420	228.05	292.	41	66528.
	3	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
38W	1	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	2W	1	73.00	0.800	1.500	1.000	1.500	282.34	351.	37	99196.
	2E	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	3	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
40W	1W	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	1E	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	2N	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	2S	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	3W	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	3E	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
42W	1	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	1N	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	1S	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	2W	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	2E	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	3	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	3N	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.
	3S	1	71.00	0.800	1.420	1.000	1.420	228.05	300.	40	68415.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 16, 1988
-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/D	P-ULT LB
43W	1E	1	71.00	0.000	1.330	1.000	1.330	200.06	263.	43	52651.
	1W	1	71.00	0.000	1.420	1.000	1.420	228.05	300.	40	68415.
	2E	1	71.00	0.000	1.500	1.000	1.500	254.47	335.	38	85185.
	2W	1	71.00	0.000	1.330	1.000	1.330	200.06	263.	43	52651.
	3E	1	71.00	0.000	1.420	1.000	1.420	228.05	300.	40	68415.
	3W	1	71.00	0.000	1.500	1.000	1.500	282.34	371.	36	104864.
46W	1	1	76.00	0.000	1.420	1.000	1.420	228.05	262.	43	59709.
	1N	1	76.00	0.000	1.420	1.000	1.420	228.05	262.	43	59709.
	1S	1	76.00	0.000	1.420	1.000	1.420	228.05	262.	43	59709.
	2E	1	75.00	0.000	1.500	1.000	1.500	254.47	300.	40	76341.
	2W	1	75.00	0.000	1.330	1.000	1.330	200.06	236.	45	47184.
	3	1	75.00	0.000	1.500	1.000	1.500	254.47	300.	40	76341.
	3N	1	73.00	0.000	1.500	1.000	1.500	254.47	317.	39	80581.
	3S	1	73.00	0.000	1.500	1.000	1.500	254.47	317.	39	80581.
47W	1E	1	76.00	0.000	1.500	1.000	1.500	254.47	292.	41	74345.
	1W	1	76.00	0.000	1.420	1.000	1.420	228.05	262.	43	59709.
	2E	1	75.00	0.000	1.420	1.000	1.420	228.05	269.	42	61312.
	2W	1	75.00	0.000	1.500	1.000	1.500	254.47	300.	40	76341.
	3E	1	74.00	0.000	1.500	1.000	1.500	254.47	308.	39	78418.
	3W	1	74.00	0.000	1.500	1.000	1.500	254.47	308.	39	78418.
50W	1	1	79.00	0.000	1.500	1.000	1.500	254.47	277.	42	68866.
	1N	1	79.00	0.000	1.420	1.000	1.420	228.05	242.	45	55268.
	1S	1	79.00	0.000	1.420	1.000	1.420	228.05	242.	45	55268.
	2E	1	77.00	0.000	1.420	1.000	1.420	228.05	255.	43	58168.
	2W	1	77.00	0.000	1.500	1.000	1.500	254.47	285.	41	72426.
	3	1	77.00	0.000	1.420	1.000	1.420	228.05	255.	43	58168.
	3N	1	75.00	0.000	1.420	1.000	1.420	228.05	269.	42	61312.
	3S	1	75.00	0.000	1.420	1.000	1.420	228.05	269.	42	61312.
51W	1E	1	80.00	0.000	1.420	1.000	1.420	228.05	236.	45	53887.
	1W	1	80.00	0.000	1.500	1.000	1.500	282.34	293.	41	82596.
	2E	1	77.00	0.000	1.420	0.005	0.100	1.14	1.	613	1.
	2W	1	77.00	0.000	1.500	1.000	1.500	282.34	316.	39	89158.
	3E	1	75.00	0.000	1.420	1.000	1.420	228.05	269.	42	61312.
	3W	1	75.00	0.000	1.420	1.000	1.420	228.05	269.	42	61312.
54W	1N	1	80.00	0.000	1.500	1.000	1.500	254.47	264.	43	67896.
	1S	1	80.00	0.000	1.500	1.000	1.500	254.47	264.	43	67896.
	1E	1	80.00	0.000	1.500	1.000	1.500	254.47	264.	43	67896.
	1W	1	80.00	0.000	1.500	1.000	1.500	254.47	264.	43	67896.
	2E	1	76.00	0.000	1.420	1.000	1.420	228.05	262.	43	59709.
	2W	1	76.00	0.000	1.420	1.000	1.420	228.05	262.	43	59709.
	3W	1	74.00	0.000	1.500	1.000	1.500	254.47	308.	39	78418.
	3N	1	74.00	0.000	1.500	1.000	1.500	254.47	308.	39	78418.
	3S	1	74.00	0.000	1.420	1.000	1.420	228.05	276.	42	62906.
	3E	1	74.00	0.000	1.500	1.000	1.500	254.47	308.	39	78418.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1980
-1

BENT	PILE	TYP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/D	P-ULT LB
55W	1E	1	80.00	0.800	1.500	1.000	1.500	254.47	264.	43	67096.
	1W	1	80.00	0.800	1.500	1.000	1.500	254.47	264.	43	67096.
	2E	1	77.00	0.800	1.500	1.000	1.500	254.47	285.	41	72426.
	2W	1	77.00	0.800	1.500	1.000	1.500	254.47	285.	41	72426.
	3E	1	75.00	0.800	1.500	1.000	1.500	282.34	333.	38	93976.
	3W	1	75.00	0.900	1.420	1.000	1.420	228.05	269.	42	61312.
58W	1	1	80.00	0.800	1.500	1.000	1.500	282.34	293.	41	82596.
	1N	1	80.00	0.800	1.500	1.000	1.500	282.34	293.	41	82596.
	1S	1	78.00	0.800	1.500	1.000	1.500	254.47	277.	42	70581.
	2E	1	78.00	0.800	1.420	1.000	1.420	228.05	249.	44	56686.
	2W	1	78.00	0.800	1.500	1.000	1.500	254.47	277.	42	70581.
	3	1	75.00	0.800	1.500	1.000	1.500	254.47	300.	40	76341.
	3N	1	75.00	0.800	1.500	1.000	1.500	282.34	333.	38	93976.
	3S	1	75.00	0.800	1.500	1.000	1.500	254.47	300.	40	76341.
59W	1E	1	79.00	0.800	1.420	1.000	1.420	228.05	242.	45	55280.
	1W	1	79.00	0.800	1.500	1.000	1.500	254.47	270.	42	68686.
	2E	1	77.00	0.800	1.500	1.000	1.500	254.47	285.	41	72426.
	2W	1	77.00	0.800	1.500	1.000	1.500	254.47	285.	41	72426.
	3E	1	76.00	0.800	1.420	1.000	1.420	228.05	262.	43	59789.
	3W	1	76.00	0.800	1.330	1.000	1.330	200.06	236.	46	45951.
62W	1	1	78.00	0.800	1.500	1.000	1.500	254.47	277.	42	70581.
	1N	1	78.00	0.800	1.420	1.000	1.420	228.05	249.	44	56686.
	1S	1	78.00	0.800	1.420	1.000	1.420	228.05	249.	44	56686.
	2E	1	77.00	0.800	1.420	1.000	1.420	228.05	255.	43	58168.
	2W	1	77.00	0.800	1.420	1.000	1.420	228.05	255.	43	58168.
	3	1	76.00	0.800	1.500	1.000	1.500	254.47	292.	41	74345.
	3N	1	76.00	0.800	1.500	1.000	1.500	254.47	292.	41	74345.
	3S	1	76.00	0.800	1.420	1.000	1.420	228.05	262.	43	59789.
63W	1E	1	79.00	0.800	1.420	1.000	1.420	228.05	249.	44	56686.
	1W	1	77.00	0.800	1.500	1.000	1.500	254.47	285.	41	72426.
	2E	1	75.00	0.800	1.500	1.000	1.500	254.47	300.	40	76341.
	2W	1	75.00	0.800	1.500	1.000	1.500	254.47	300.	40	76341.
	3E	1	74.00	0.800	1.330	1.000	1.330	200.06	242.	45	48468.
	3W	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
66W	1	1	73.00	0.800	1.500	1.000	1.500	254.47	317.	37	80581.
	1N	1	73.00	0.800	1.420	1.000	1.420	228.05	294.	41	64717.
	1S	1	73.00	0.800	1.420	1.000	1.420	228.05	294.	41	64717.
	2E	1	72.00	0.800	1.500	1.000	1.500	282.34	361.	36	101971.
	2W	1	72.00	0.800	1.750	1.000	1.750	346.36	443.	33	153462.
	3	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	3N	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	3S	1	71.00	0.800	1.330	1.000	1.330	200.06	263.	43	52651.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1980
-1

PENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/D	P-ULT LB
67W	1E	1	73.00	0.800	1.500	1.000	1.500	282.34	351.	37	99196.
	1W	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	2E	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	2W	1	72.00	0.800	1.420	1.000	1.420	228.05	292.	41	66528.
	3	1	71.00	0.800	1.500	1.000	1.500	282.34	371.	36	104864.
	3W	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	3E	1	71.00	0.800	1.500	1.000	1.500	282.34	371.	36	104864.
69W	1	1	74.00	0.800	1.500	1.000	1.500	254.47	308.	37	78418.
	1W	1	74.00	0.800	1.500	1.000	1.500	254.47	308.	39	78418.
	1E	1	73.00	0.800	1.500	1.000	1.500	254.47	317.	39	80581.
	2E	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	2W	1	72.00	0.800	1.500	1.000	1.500	282.34	361.	36	101971.
	2W	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	3W	1	71.00	0.800	1.500	1.000	1.500	282.34	371.	36	104864.
	3E	1	71.00	0.800	1.330	1.000	1.330	200.86	263.	40	52651.
71W	1E	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	1W	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	2E	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	2W	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	3	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	3W	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
	3E	1	71.00	0.800	1.500	1.000	1.500	254.47	335.	38	85185.
72W	1E	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	1W	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	2E	1	73.00	0.800	1.500	1.000	1.500	254.47	317.	39	80581.
	2W	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	3	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3W	1	72.00	0.800	1.420	1.000	1.420	228.05	292.	41	66528.
	3E	1	72.00	0.800	1.500	1.000	1.500	282.34	361.	36	101971.
73W	1E	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	1W	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	2E	1	73.00	0.800	1.500	1.000	1.500	254.47	317.	39	80581.
	2W	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	3	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3W	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3E	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
74W	1E	1	74.00	0.800	1.500	1.000	1.500	254.47	308.	39	78418.
	1W	1	74.00	0.800	1.500	1.000	1.500	254.47	308.	39	78418.
	2E	1	73.00	0.800	1.500	1.000	1.500	254.47	317.	39	80581.
	2W	1	73.00	0.800	1.500	1.000	1.500	254.47	317.	39	80581.
	3	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3W	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3E	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 13, 1980
-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/D	P-ULT LB
75W	1E	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	1W	1	74.00	0.800	1.420	1.000	1.420	228.05	276.	42	62980.
	2E	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	2W	1	73.00	0.800	1.420	1.000	1.420	228.05	284.	41	64717.
	3	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3N	1	72.00	0.800	1.500	1.000	1.500	254.47	326.	38	82835.
	3S	1	72.00	0.800	1.420	1.000	1.420	228.05	292.	41	66528.
76W	1E	1	75.00	0.800	1.420	1.000	1.420	228.05	269.	42	61312.
	1W	1	75.00	0.800	1.420	1.000	1.420	228.05	269.	42	61312.
	2E	1	74.00	0.800	1.500	1.000	1.500	254.47	308.	39	78418.
	2W	1	74.00	0.800	1.500	1.000	1.500	254.47	308.	39	78418.
	3	1	73.00	0.800	1.580	1.000	1.580	282.34	351.	37	99196.
	3N	1	73.00	0.800	1.550	1.000	1.580	282.34	351.	37	99196.
	3S	1	73.00	0.800	1.500	1.000	1.500	254.47	317.	39	80581.
77W	1E	1	76.00	0.800	1.500	1.000	1.500	254.47	292.	41	74345.
	1W	1	76.00	0.800	1.420	1.000	1.420	228.05	262.	43	59729.
	2E	1	75.00	0.800	1.500	1.000	1.500	254.47	300.	40	76341.
	2W	1	75.00	0.800	1.500	1.000	1.500	254.47	300.	40	76341.
	3	1	74.00	0.800	1.580	1.000	1.580	282.34	342.	37	96503.
	3N	1	74.00	0.800	1.420	0.005	0.100	1.14	1.	578	2.
	3S	1	74.00	0.800	1.500	0.005	0.105	1.27	2.	558	2.
EAST PIER											
42E	1N	1	62.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	1S	1	63.00	0.800	1.500	1.000	1.500	254.47	425.	34	108193.
	2E	1	63.00	0.800	1.420	1.000	1.420	228.05	331.	35	86893.
	2N	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2S	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
43E	1	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2E	1	63.00	0.800	1.420	1.000	1.420	228.05	331.	35	86893.
	2W	1	63.00	0.800	1.420	1.000	1.420	228.05	331.	35	86893.
	3	1	63.00	0.800	1.250	1.000	1.250	176.71	295.	40	52176.
44E	1N	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	1S	1	63.00	0.800	1.250	1.000	1.250	176.71	295.	40	52176.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3N	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3S	1	63.00	0.800	1.250	1.000	1.250	176.71	295.	40	52176.
47E	1	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2E	1	63.00	0.800	1.420	1.000	1.420	228.05	331.	35	86893.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1980
-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/D	P-ULT LB
	2W	1	63.00	0.800	1.670	1.000	1.670	315.42	527.	38	166226.
	3	1	63.00	0.800	1.500	1.000	1.500	254.47	425.	34	128173.
50E	1N	1	65.00	0.800	1.420	1.000	1.420	228.05	358.	37	81628.
	1S	1	65.00	0.800	1.420	1.000	1.420	228.05	358.	37	81628.
	2E	1	65.00	0.800	1.420	1.000	1.420	228.05	358.	37	81628.
	2W	1	65.00	0.800	1.420	1.000	1.420	228.05	358.	37	81628.
	3N	1	65.00	0.800	1.330	1.000	1.330	200.06	314.	39	62819.
	3S	1	65.00	0.800	1.500	1.000	1.500	254.47	399.	35	101637.
51E	1	1	65.00	0.800	1.500	1.000	1.500	262.34	443.	33	125116.
	2E	1	65.00	0.800	1.500	1.000	1.500	262.34	443.	33	125116.
	2W	1	65.00	0.800	1.420	1.000	1.420	228.05	358.	37	81628.
	3	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
52E	1N	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	1S	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
	2E	1	66.00	0.800	1.250	1.000	1.250	176.71	269.	42	47541.
	2W	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
	3N	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	3S	1	66.00	0.800	1.500	1.000	1.500	262.34	439.	33	121054.
53E	1	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	2E	1	66.00	0.800	1.330	1.000	1.330	200.06	305.	40	60930.
	2W	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
	3	1	66.00	0.800	1.420	1.000	1.420	228.05	347.	37	79173.
54E	1	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	1N	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	1S	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	2E	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	2W	1	67.00	0.800	1.330	1.000	1.330	200.06	296.	40	59125.
	3	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	3N	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	3S	1	67.00	0.800	1.500	1.000	1.500	254.47	376.	36	95666.
55E	1E	1	67.00	0.800	1.500	1.000	1.500	254.47	376.	36	95666.
	1W	1	67.00	0.800	1.250	1.000	1.250	176.71	261.	43	46132.
	2E	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	2W	1	67.00	0.800	1.420	1.000	1.420	228.05	337.	38	76828.
	3E	1	67.00	0.800	1.330	1.000	1.330	200.06	296.	40	59125.
	3W	1	67.00	0.800	1.500	1.000	1.500	782.34	417.	34	117758.
62E	2N	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2S	1	63.00	0.800	1.250	1.000	1.250	176.71	295.	40	52176.
	1	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	1N	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	1S	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871
	2E	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1980
-1

BENT	PILE	TIP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA INZ	C PSI	L/D	P-ULT LB
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3N	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3S	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
3E	1E	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	1W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3E	1	63.00	0.800	1.500	1.000	1.500	254.47	425.	34	108193.
	3W	1	63.00	0.800	1.500	1.000	1.500	254.47	425.	34	108193.
4E	1	1	60.00	0.800	1.330	1.000	1.330	200.06	369.	36	73725.
	1N	1	60.00	0.800	1.420	1.000	1.420	228.05	420.	34	95800.
	1S	1	60.00	0.800	1.420	1.000	1.420	228.05	420.	34	95800.
	2E	1	60.00	0.800	1.420	1.000	1.420	228.05	420.	34	95800.
	2W	1	60.00	0.800	1.500	1.000	1.500	254.47	469.	32	119282.
	3	1	60.00	0.800	1.500	1.000	1.500	254.47	469.	32	119282.
	3N	1	60.00	0.800	1.420	1.000	1.420	228.05	420.	34	95800.
	3S	1	60.00	0.800	1.500	1.000	1.500	282.34	520.	30	146838.
5E	1E	1	60.00	0.800	1.330	1.000	1.330	200.06	369.	36	73725.
	1W	1	60.00	0.800	1.330	1.000	1.330	200.06	369.	36	73725.
	2E	1	60.00	0.800	1.330	1.000	1.330	200.06	369.	36	73725.
	2W	1	60.00	0.800	1.330	1.000	1.330	200.06	369.	36	73725.
	3	1	60.00	0.800	1.500	1.000	1.500	282.34	520.	30	146838.
	3N	1	60.00	0.800	1.500	1.000	1.500	254.47	469.	32	119282.
	3S	1	60.00	0.800	1.500	1.000	1.500	282.34	520.	30	146838.
6E	1	1	62.00	0.800	1.250	1.000	1.250	176.71	305.	40	53873.
	1N	1	62.00	0.800	1.250	1.000	1.250	176.71	305.	40	53873.
	1S	1	62.00	0.800	1.330	1.000	1.330	200.06	345.	37	69046.
	2E	1	62.00	0.800	1.420	1.000	1.420	228.05	393.	35	89719.
	2W	1	62.00	0.800	1.330	1.000	1.330	200.06	345.	37	69046.
	3	1	62.00	0.800	1.330	1.000	1.330	200.06	345.	37	69046.
	3N	1	62.00	0.800	1.420	1.000	1.420	228.05	393.	35	89719.
	3S	1	62.00	0.800	1.420	1.000	1.420	228.05	393.	35	89719.
7E	1E	1	62.00	0.800	1.420	1.000	1.420	228.05	393.	35	89719.
	1W	1	62.00	0.800	1.420	1.000	1.420	228.05	393.	35	89719.
	2E	1	62.00	0.800	1.330	1.000	1.330	200.06	345.	37	69046.
	2W	1	62.00	0.800	1.670	1.000	1.670	315.42	544.	30	171631.
	3	1	62.00	0.800	1.420	1.000	1.420	228.05	393.	35	89719.
	3N	1	62.00	0.800	1.330	1.000	1.330	200.06	345.	37	69046.
	3S	1	62.00	0.800	1.420	1.000	1.420	228.05	393.	35	89719.
8E	1E	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	1W	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	2E	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.

MAGNETIC SILENCING FACILITY PILE LOADING CAPACITIES
NAVAL SUBMARINE BASE, TRIDENT SUPPORT SITE
BANGOR WASHINGTON NOVEMBER 18, 1980
-1

BENT	PILE	ITP	LENGTH FT	EFF-L FACTOR	ORG-DIA FT	EFF-ARA FACTOR	EFF-DIA FT	EFF-ARA IN2	C PSI	L/D	P-ULT LB
	2W	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	3	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	3N	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	3S	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
73E	1E	1	63.00	0.800	1.500	1.000	1.500	254.47	425.	34	108193.
	1W	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	3N	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3S	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
74E	1E	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	1W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2E	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	2W	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3N	1	63.00	0.800	1.330	1.000	1.330	200.06	334.	38	66871.
	3S	1	63.00	0.800	1.500	1.000	1.500	254.47	425.	34	108193.
75E	1E	1	63.00	0.800	1.500	1.000	1.500	254.47	425.	34	108193.
	1W	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	2E	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	2W	1	63.00	0.800	1.670	1.000	1.670	315.42	527.	30	166226.
	3	1	63.00	0.800	1.580	1.000	1.580	282.34	472.	32	133187.
	3N	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
	3S	1	63.00	0.800	1.420	1.000	1.420	228.05	381.	35	86893.
76E	1E	1	64.00	0.800	1.330	1.000	1.330	200.06	324.	38	64798.
	1W	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
	2E	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
	2W	1	64.00	0.800	1.330	1.000	1.330	200.06	324.	38	64798.
	3	1	64.00	0.800	1.580	1.000	1.580	282.34	457.	32	129057.
	3N	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
	3S	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
77E	1E	1	64.00	0.800	1.330	1.000	1.330	200.06	324.	38	64798.
	1W	1	64.00	0.800	1.500	1.000	1.500	254.47	412.	34	104838.
	2E	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
	2W	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
	3	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
	3N	1	64.00	0.800	1.420	1.000	1.420	228.05	369.	36	84199.
	3S	1	64.00	0.800	1.500	1.000	1.500	254.47	412.	34	104838.

A.A ENVIRONMENTAL DATA

The facility is located on the eastern shore of Hood Canal on the Kitsap Peneinsula (See Figures 1 - 3). The region is a long, north-south lowland situated between mountain ranges on the east and west. The region's ecology is characterized by dense conifer forests.

The topography of Bangor Annes is predominantly flat to gently rolling. Hills and valleys on site are irregular but have a general north-south trend. Three major streams and numerous minor drainages run through the site towards Hood Canal to the west.

The Hood Canal shore of the Bangor Annex is for the most part erosional, with steep wave cut slopes rising to more than 100 feet above sea level. The seashore environment is characterized by a slow erosion of the cliff and deposition of erosional debris (silts and sands) from the streams to offshore deltas.

The sea bottom slopes uniformly down toward the Hood Canal in a slope of about one in 10. Soils data indicates a major portion of the Bangor Annex is covered with a glacial till of a dense gravel-sand-silt mixture. This relatively impermiable material varies in thickness from zero to more than 40 feet, with the thickest layer being in the southern portion of the site. Much of the till is covered by a relatively thin layer (10 feet) of medium dense sand and gravel with some areas of surface soils and gravel deposits.

Offshore, along the Bangor shoreline, the sea floor is covered with recent loose to medium dense granular materials at varying depths. At some locations, a wedge of till follows, thickening towards the center of the Canal. These sloping soils overlie and truncate a series of essentially horizontal sand silt strata. In the offshore areas, artesian conditions occur in areas where these silt strata exist. Offshore soil conditions were found to be generally good for offshore construction. Exceptions to this were found in areas where less suitable soil artesian conditions and till deposits occur and may

require some remedial preparation for emplacement of waterfront facilities.

Climatic conditions of Bangor Annex are representative of the Kitsap Peninsula, with short, cool, dry summers and mild, wet winters. Annual precipitation varies from 30 to 70 inches with 75 to 80 percent of the annual rainfall occurring from October to March. The Kitsap Peninsula and Hood Canal are susceptible to slightly higher winds than other areas of the Puget Sound lowlands. The strongest winds are from the south and southwest and usually occur when intense Pacific storms move inland.

Precipitation Averages:

Keyport	-	30.66 inches annual rainfall
Pemerton	-	38.66 inches annual rainfall
Seattle	-	34.10 inches annual rainfall
Quilcene	-	50.90 inches annual rainfall

Tidal range at the site is:

Extreme High Water (EHW)	-	+14.6 feet
Mean Higher High Water (MHHW)	-	+10.9 feet
Mean Tide Level (MTL)	-	+ 6.4 feet
Mean Lower Low Water (MLLW)	-	0.0 feet
Extreme Low Water (ELW)	-	- 4.5 feet

Elevations are based on Mean Lower Low Water which is 6.146 feet below Geodetic sea level datum of 1929 through the Pacific Northwest supplementary adjustment of 1947.

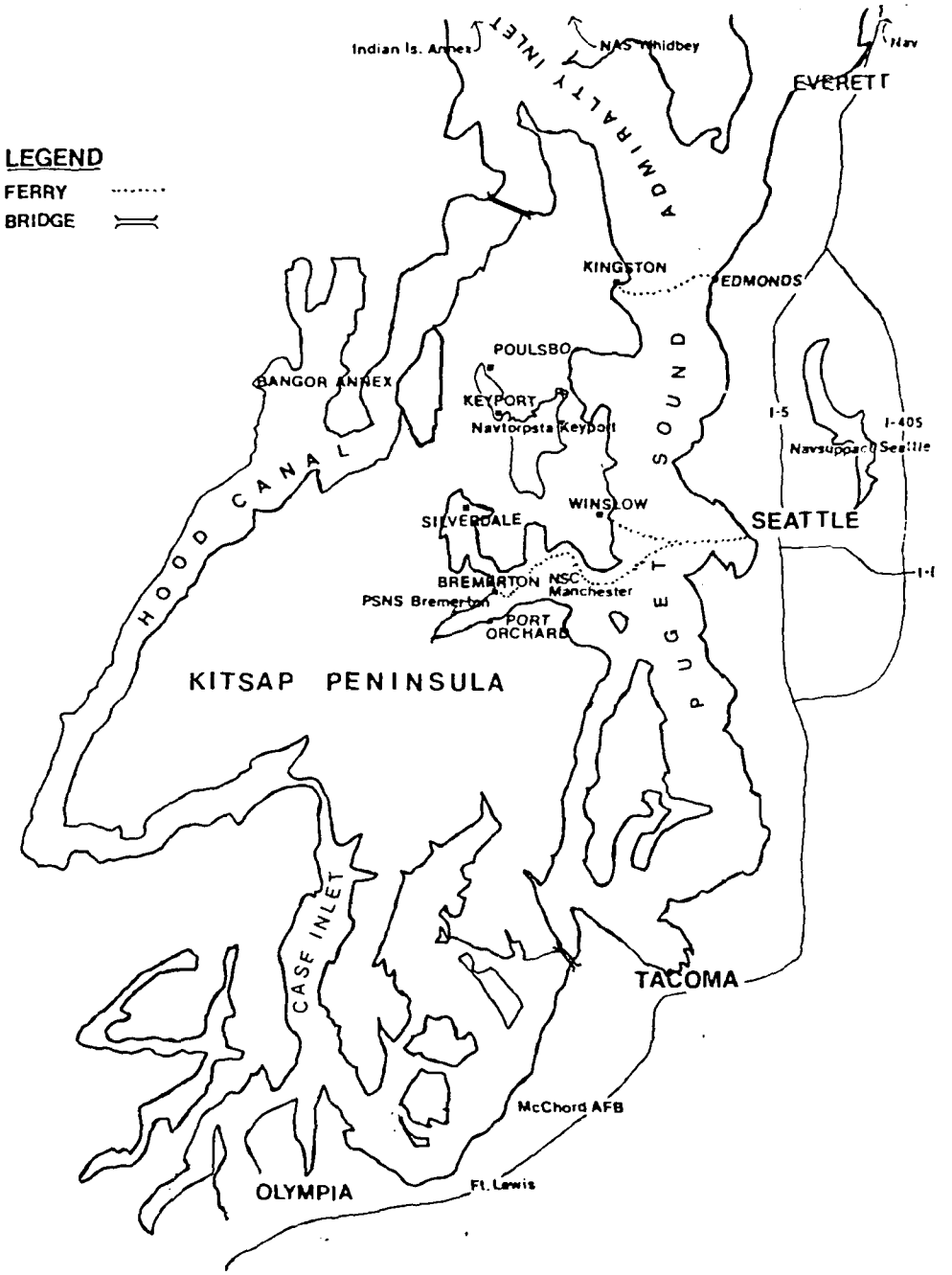
Wave forces at the site are based on an estimated significant wave height for 1 75 MPH wind velocity over a maximum fetch of 12 miles.

Earthquake criteria established for Seismic Probability Zone 3 in accordance with NAVFAC P-355 and Collapse Resistance Criteria for critical load structures in accordance with NAVFAC DM-2 Lateral Seismic Load Factors:

K = 1.0

C = 0.05/T 1/3 for each structural element

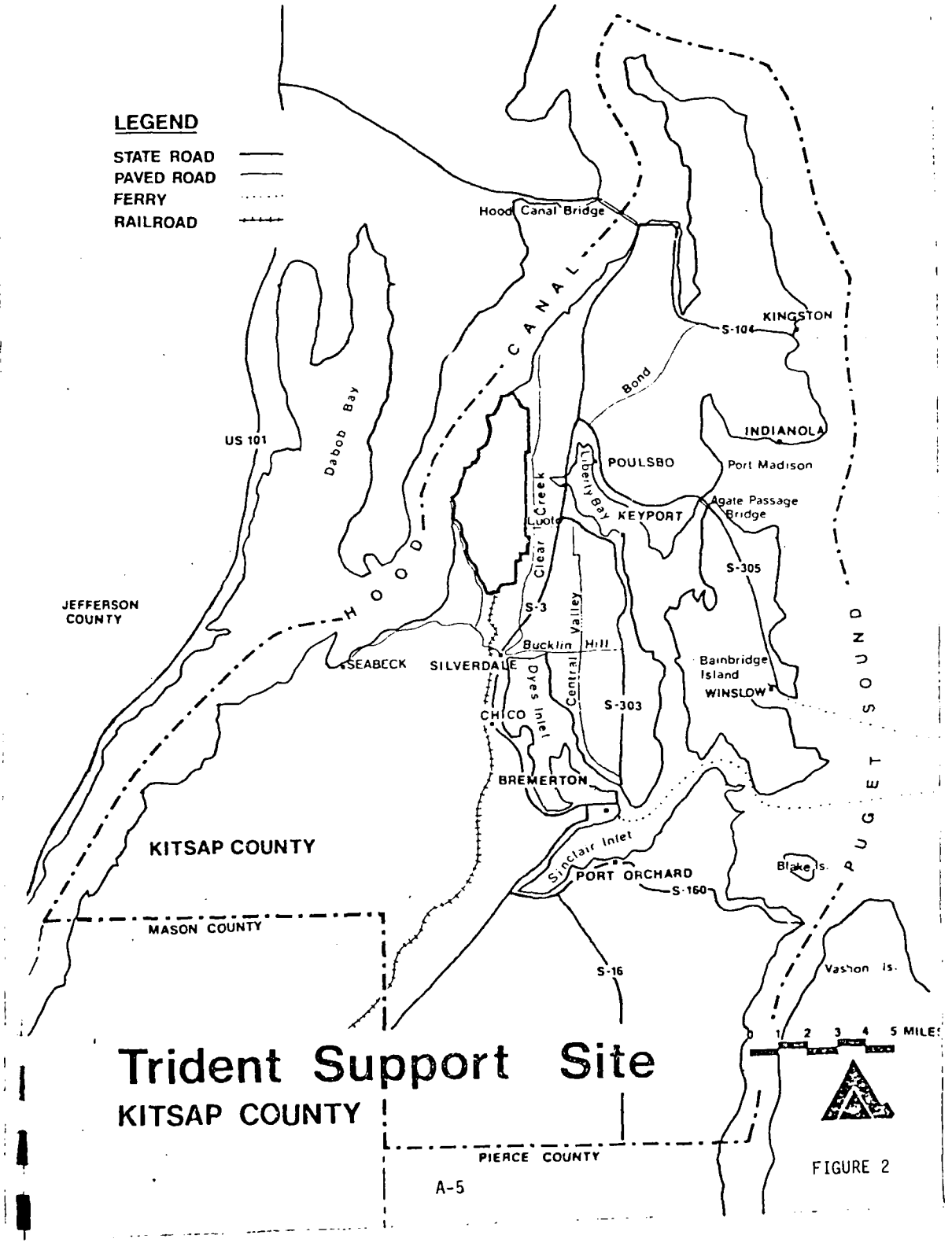
Z = 1.00



Trident Support Site

PUGET SOUND · AREA

FIGURE 1



Trident Support Site
KITSAP COUNTY

FIGURE 2

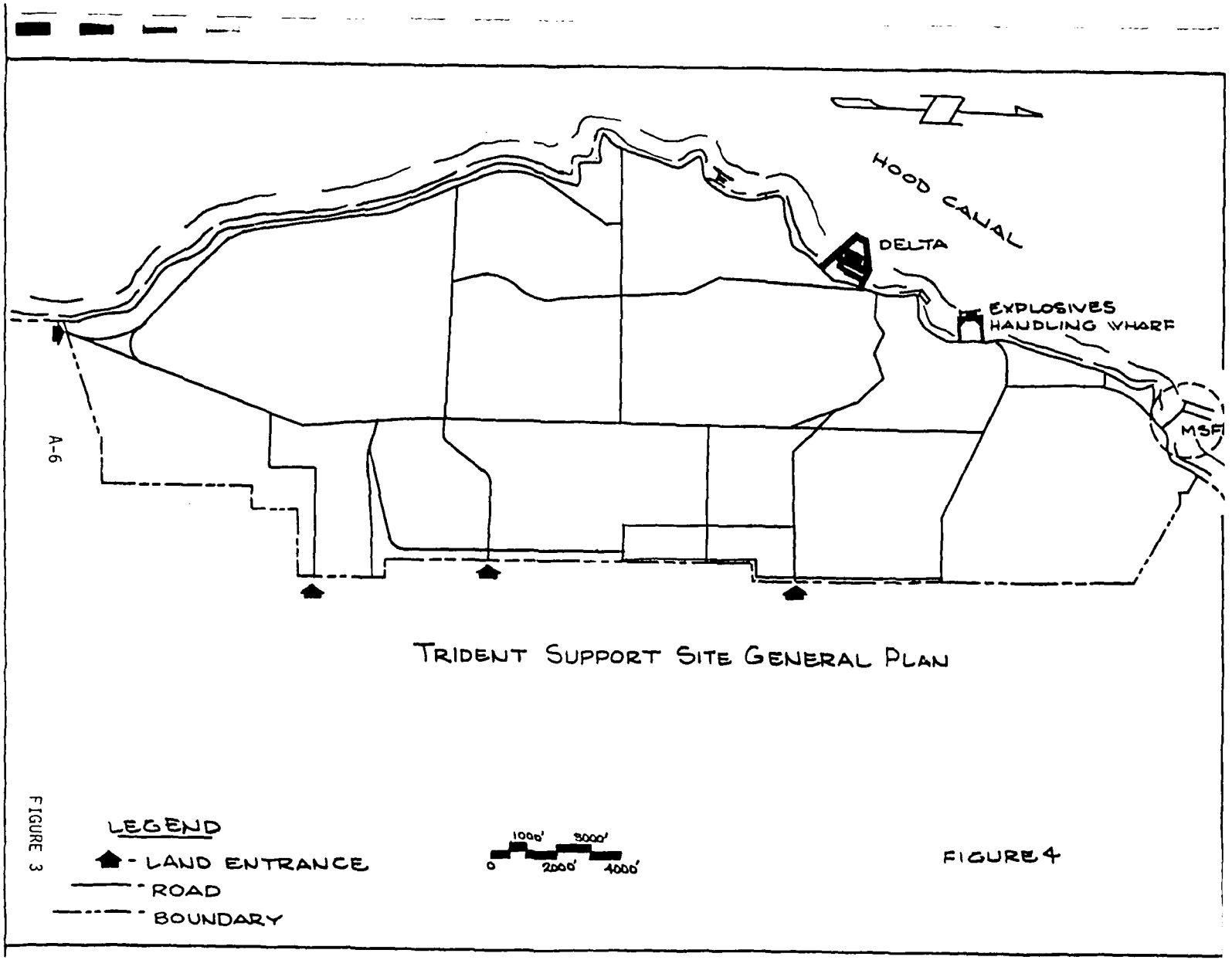


FIGURE 3

FIGURE 4

B.A INSPECTION PROCEDURE

B.A.a Background on Instrumentation and Methods

The ULTRASCAN PTM-4 pile testing instruments are the results of studies initiated, at B.C. Research in 1955, to develop instruments for nondestructive testing of in-place marine piling. It was found that the velocity and strength of sound waves passing through wood varied inversely with voids in wood caused by marine borers. Based on this principle, instruments were developed which use magnetostrictive transducers to provide an ultrsaonic "scan" of the pile. The plane waves which penetrate the wood, from the transmitting transducer, initiate transmission of secondary sonic patterns in the direction of the wood grain. As these wave trains transmit along the axis of the pile they produce radial sets of waves which are picked up by the transducer. Undamaged wood is an excellent transmitter of these waves whereas damaged wood attenuates the sound. During the development stage, extensive axial load testing of pile sections was carried out and correlations were established between the sonic readings and the remaining undamaged cross-section of the pile. A direct meter readout is provided showing the precentage of sound wood remaining. Verification and refinement of the initial methods has been carried out by testing in-place piling, removing the piles and subjecting them to inspection and axial load testing. Good correlation was found between the sonic readings, the remaining undamaged area of the pile and the strength ratings based on the sonic instruments.

The testing crew consists of two men, a SCUBA diver who provides visual observations and scans the entire surface of the pile with the sonic "probe" (See Photograph No. 19), and a surface technician who monitors the observations and readings produced on the meter. (See Photograph No. 18). The probe is attached to the pile by the diver at the water surface. The diver then proceeds to scan the entire length of the pile from the surface to the mudline. The instruments provide a continuous cross-sectional area readout which is recorded by the surface technician. When the mudline is reached,

The probe is moved onto the adjacent pile in the bent and the process is repeated from the mudline to the surface. Removal of fouling is not required for operation of the unit. The pile "ratings" are given in terms of undamaged cross-sectional area remaining in each pile. These ratings are based on the least cross-sectional area found as revealed by sonic and visual data. The ratings are given in quartiles and indicate both the location and degree of loss of pile cross-section in damaged piles. Based on the data provided, the new L/d ratio of a pile can be established in light of damage found. This data, in turn, provides the basis for individual column analysis and overall structural analysis.

The ULTRASCAN is used to detect and assess marine borer and mechanical damage in the immersed areas of the pile from mudline to high tide level. Additional inspection is carried out from the high tide level to the cap to locate any possible mechanical or fungal damage.

B.A.b Reasons for Selection of Particular Instrumentation and Methods

Bankia damage in piling can only be determined by underwater inspection, with many attendant difficulties. If the *Bankia* are alive and the siphons are extended, recognition is not too difficult. If the siphons are retracted or the *Bankia* are dead, detection of the burrow openings is not easy. In many instances, fouling must be scrubbed off the piling in order to facilitate an inspection. If visibility is limited, as frequently occurs in industrial locations, visual inspection is hopeless. Even if teredine entry holes are observed, an evaluation of internal damage, by purely visual means, is not possible. (See Photographs 20 and 21).

Because of these difficulties, the sonic testing method was initially developed to locate and evaluate teredine damage. It was felt that *Limnoria* damage could be readily detected visually, since the damage

progressed from the surface inward. Experience, however, has shown that the sonic testing method substantially enhances the detection and evaluation of damage even in areas where *Limnoria* is the primary source of infestation. Some of the reasons for this are as follows:

1. In areas with poor or non-existent underwater visibility, sonic testing expedites the examination by locating the damage and providing a quantitative evaluation of the residual strength.

2. *Limnoria* attack very often takes the path of least resistance. That is, *Limnoria* will gain access into a pile through a small breach in the creosoted layer and destroy the untreated heartwood with very little surface evidence of damage. A good example of this is a U.S. Navy Fuel Dock. In this particular structure a considerable number of piles, which have been destroyed by *Limnoria*, show no obvious visual indication of damage. The reason for this is that the *Limnoria* has gained access to the pile through open boltholes. The boltholes are virtually impossible to detect unless all fouling is removed from the pile and a minute visual examination is carried out. This type of visual examination would be very time consuming and costly. It would be further restricted by poor underwater visibility.

3. *Limnoria* damage, particularly in Southern waters, very often exposes the treated pile to teredine attack which would be very difficult to detect and assess visually.

B.B PERSONNEL ON PROJECT

Jerry Agi	- Project Manager
Erling Vegsund	- Project Supervisor
Scott Christie	- Engineering Technician
Fred Phillips	- Drafting and Graphics
Maria Sjoquist	- Report Preparation

PHOTOGRAPH No. 18

The surface unit monitored by technician. The meter provides a continuous cross-sectional area readout -- also two-way telephone contact between diver and surface.

PHOTOGRAPH No. 19

The ULTRASCAN PTM-4, the underwater sonic probe unit used to scan piles and locate internal damage. Probe is manipulated by diver.

PHOTOGRAPH No. 20

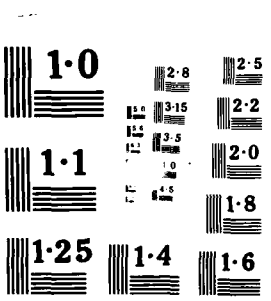
Creosote treated pile section with virtually no evidence of internal damage -- shows the difficulty of providing quantitative structural data visual inspection.

PHOTOGRAPH No. 21

Same pile cut to show extensive internal teredine damage.

AD-A168 674 UNDERWATER FACILITIES INSPECTION AND ASSESSMENT AT DEPERMING PIER TRIDENT..(U) AGI (J) AND ASSOCIATES INC SEATTLE WA JUN 84 CHES/NAVFAC-FPO-1-84(15) 2/2

UNCLASSIFIED N62477-84-D-0024 F/G 13/2 NL


1·0
1·1
1·25
2·8
3·15
3·5
4·5
1·4
2·5
2·2
2·0
1·8
1·6

B.C TIME OF PROJECT

The field inspection was carried out during the week of June 4, 1984.

B.D. EXIT BRIEFING

At 1300 on 8 June, 1984, Mr. Philip Scola, Program Manager, Chesapeake Division Naval Facilities Engineering Command and Mr. Jerry Agi, Project Manager, J. Agi & Associates briefed personnel from Trident Refit Facility (TRF) on inspection findings. This was essentially an overview of the contents of Sections 4.3 and 4.4 of this report. It was emphasized that while inspecting the required bearing piles and cable troughs *Bankia* and *Limnoria* attack was observed on other timber members. These were the framing timbers which support the trough poles at the pier bearing piles, cut ends of wales and cross-bracing timbers, and other cable supports. A recommendation was made to inspect all these miscellaneous timber members and a ballpark of $15,000.00 was estimated for that inspection. Attendees were as follows:

Tom Forstall, Department Manager, Idustrial Facilities Eng. TRF Code 200
Jim McPherson, Facility Manager, TRF Code 220
Dave Johnson, Engineering Technician, TRF Code 221
Roger Bushnell. Engineering Technician, TRF Code 222
Gene Grade, Magnetic Silencing Division Director, TRF Code 230
Rod Wigman, Engineer, TRF Code 231

END

DATE
FILMED

7-86

DTIC